ENGINEERING NEWS-RECORD

DEC. 1, 1960

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New Plants for New Products pg. 50

STEVENS RICE GS
UNIV MICROFILMS INC
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The Versatile Shapes of CONCRETE

The adaptability of concrete is self-evident in the variety of useful and ornamental products manufactured by Concrete Units, Inc., Austin, Minn. These range from building staples like chimney block, concrete brick and low silhouette building block to precast road markers, ornamental animals and birds, flower pots, tables, stools, seesaw bases, bird baths and incinerators. A number of these appear in the picture of the company's attractive showroom and patio below.

Penn-Dixie cement is used by Concrete Units, Inc. and many other makers of precast concrete building materials and ornamental products.

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Penn-Dixie means Permanent Dependability

Structural Engineers: Shelton & Stanford; General Contractor: McCloskey & Co.

Heavy truss gets ride on Capitol Hill

This 14-ton steel truss being raised into position is 36 ft long. It's one of 128 trusses being used in the construction of the House of Representatives Additional Office Building, in the nation's capital. Upon completion, the 9-story structure, with its 33,600,000 cu ft of space, will be the largest of the buildings occupied by the legislative branch of government.

Bethlehem Wire Rope was called upon for countless lifting jobs at this gigantic construction project. Day after day, as the steel went into place, this quality rope gave reliable, economical service.

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Wire Rope depots and distributors from coast to coast stock Bethlehem Rope

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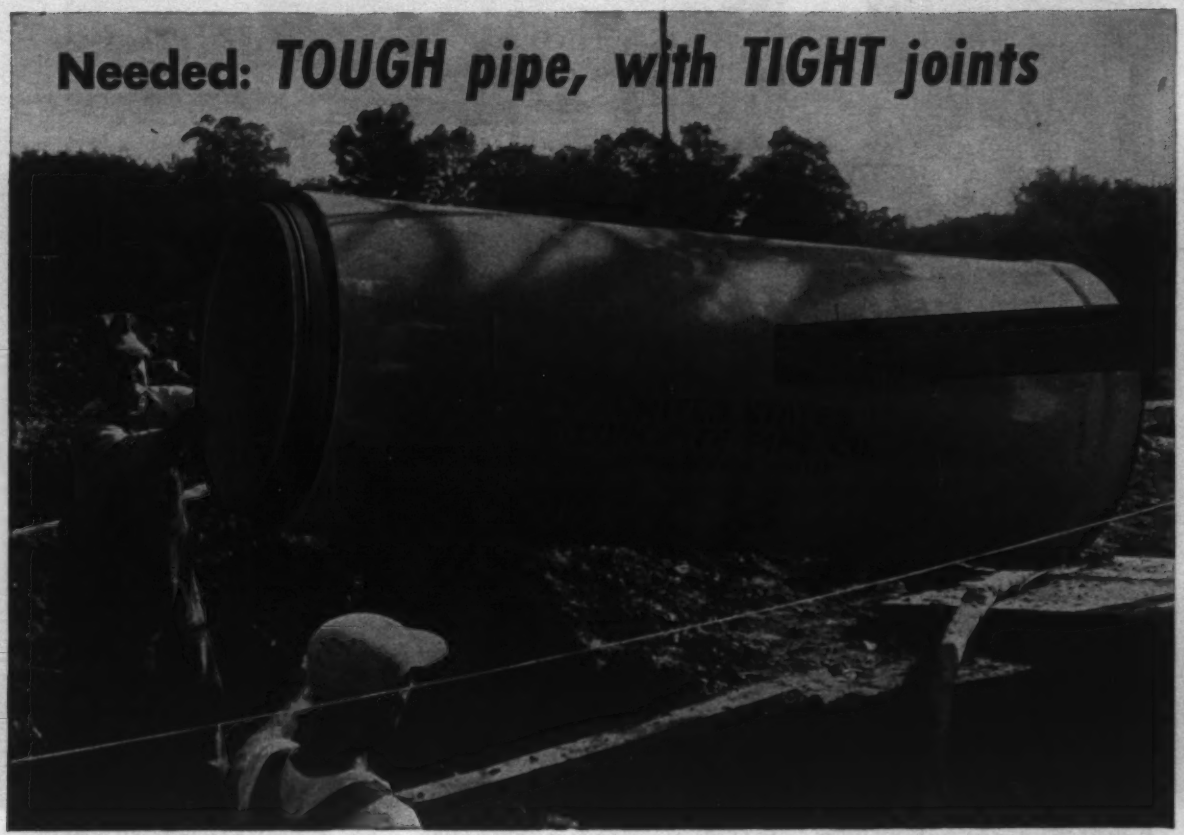

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UNITED STATES CONCRETE PIPE with "UNIFLEX" O-Ring Rubber GASKETS

"The line goes *under* a watercourse in one place, and a shopping plaza will be built *over* it in another," said M. A. Picone, Project Engineer, in discussing the East Interceptor Sanitary Sewer under construction for the Village of Twinsburg, Ohio. "We don't want infiltration from the creek," he said, "and we *can't* risk having pipe break, or develop leaky joints under the plaza. By using a pipe and gasket well known for ruggedness and permanently water-tight joints, we played safe on both counts."

Picone's firm, Willard F. Schade & Associates, Consulting Engineers of Cleveland, Ohio, designed the project and supervised construction. Field inspection is by Harold Scott, Twinsburg Village Engineer. Shullo Construction Co., Akron, Ohio is installing the "Uniflex" O-Ring jointed United States Concrete Pipe, A.S.T.M. C-76, Type IV, Wall B.

Take advantage of *tough* United States Concrete Pipe, and *water-tight* "Uniflex" O-Ring Gaskets, when you plan concrete sewers in the area we serve. It is the surest way to tighter-jointed, longer-lasting pipe lines. Details on request.

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Coated Fab-Form's red oxide coating shields the base steel from corrosive elements in concrete. Here, on the roof of Looman Associates Office Building in Trenton, N. J., coated Fab-Form was installed by a four-man crew in just one day. Architect, Kramer, Hirsch & Carchidi; Structural Engineer, Leonard Busch; Contractor, Belli Co.; all of Trenton. On this job, Fab-Form was distributed by American Steel Engineering Co., Philadelphia.

HOW TO SEE RED—AND LIKE IT

Pittsburgh Steel's New Coated Fab-Form Has "Better Corrosion Resistance," Says Philadelphia Contractor; "Goes Down Faster Than Other Steel Forms"

When a builder gets blood in his eye, you can bet he's scowling at a cost sheet.

But many a contractor, architect and builder is seeing red these days —and liking it.

They're the alert people who have used Pittsburgh Steel Company's coated Fab-Form, a new corrugated, permanent steel form for concrete floor and roof slabs.

They were quick to see these Fab-Form benefits:

• **Bonderized,** baked-on, red-oxide coating—shrugs off bad weather and shields the base steel from corrosive elements in concrete.

• **Extra length**—standard sizes or custom cut up to 28 feet, 3 inches.

• **Extra width**—32-inch cover width, the widest available.

• **Deeper corrugation**—full 5/8 inch in high-tensile (90,000-100,000 psi), 27-gage cold-rolled steel.

• **Case in Point**—G&H Steel Service of Drexel Hill, Pa., has laid 200,000 square feet of Fab-Form on two jobs designed for poured floors and roofs over steel joists.

G&H installed about 100,000 square feet of coated Fab-Form in the seven-story Looman Associates Office Building at Trenton, N. J.

Selected over other types of corrosion-resistant, permanent steel forms, coated Fab-Form lengths were engineered to the structural layout. Special 27-foot, 3-inch lengths saved the contractor—Belli Company of Trenton—material, time and installation costs.

Joseph H. De Vido, Belli job superintendent, said:

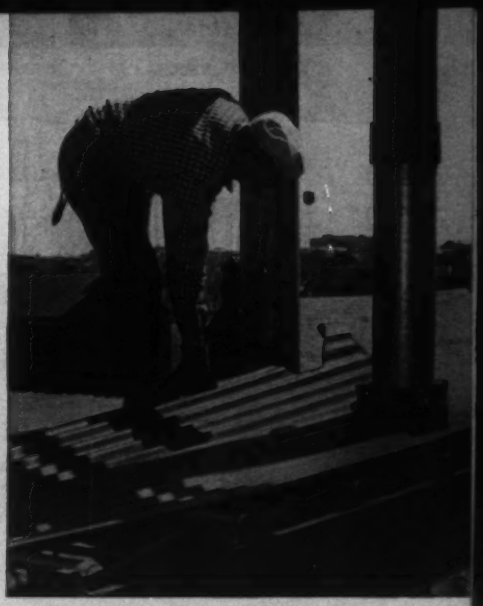
"Fab-Form's extra-long length and wider width certainly helped to get these floors and roof poured faster. Its protective coating definitely makes a cleaner job. I'm convinced the red oxide finish has better corrosion resistance than other coated sheet material.

"Weather and rough handling don't seem to have any effect on the coating."

• **Easier, Faster**—G&H Foreman Bob Tindall agrees that longer, wider Fab-Form—with fewer end and side laps—"goes down faster" than other steel forms.

Using self-tapping screws to fasten Fab-Form to bar joists, Tindall and

Extra-long lengths of coated Fab-Form, 27 feet, 3 inches, were specially commended by job superintendent on Looman Building job. "Fab-Form's extra-long length and wider width certainly helped to get these floors and roof poured faster," he declared. "I'm convinced the red oxide finish has better corrosion resistance than other coated sheet material."



Precision-manufactured, Fab-Form easily fits around obstructions such as columns and pipes. Installation was easier and faster because corrugations line up precisely on end laps.

his three-man crew averaged a day and a half to install each floor on the Looman Building. Installing the obstruction-free roof deck took just a day.

Tindall said installation was easier and faster because Fab-Form's corrugations lined up precisely on end laps. No extra fitting effort was needed.

Fab-Form comes in plain steel, too, for applications where corrosion resistance is not a major factor.

G&H Steel Service first got Fab-Form's benefits when it installed 100,000 square feet of plain Fab-Form for floor and roof of Snellenburgs Department Store's new suburban branch in the Lawrence Park Center near Philadelphia.

• **Time, Material Saved**—Sizes on this engineered Fab-Form layout ranged from standard 12-foot, 3-inch lengths through special lengths up to 19 feet, 9 inches. This gave maximum savings of material with minimum installation time.

As with the Looman Building, Fab-Form was laid over steel joists with self-tapping screws to support a three-inch poured concrete roof and floor. Pittsburgh Steel's welded wire fabric was laid to give the slab reinforcement.

Job Superintendent Smith Harris of G&H Steel Service reported that installation was fast. Work crews had less trouble fitting side laps and matching end laps with Fab-Form than normally is encountered with other types of steel forms. He said:

"We ordered Fab-Form in lengths engineered to the job. Fab-Form's 32-inch cover width means fewer side laps and its longer lengths, fewer end laps. That adds up to less waste material and speedier installation —which means more money in our pocket."

If you, too, have blood in your eye from studying floor and roof deck costs, look to Pittsburgh Steel's new Fab-Form. Its built-in benefits will go to work for you. Write today for Fab-Form literature that shows how. Or, contact the nearest Pittsburgh Steel Products Division district sales office listed below.

Trained sales engineers are available to help you.

Self-tapping screws fasten uncoated Fab-Form sheets at Snellenburgs suburban store near Philadelphia. Architects and Engineers, Thalheimer and Weitz; Contractor, McCullough-Howard & Co., Inc., all of Philadelphia.

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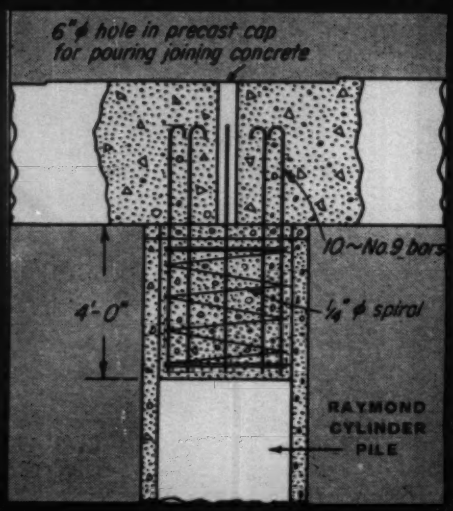

PONTCHARTRAIN TO PENSACOLA:

RAYMOND and the case of the traveling bridge

From an assembly line two hundred miles away, thousands of Raymond prestressed concrete cylinder piles were floated to the site of the new $8,000,000 Pensacola Bay Bridge.

Because of tricky bottom conditions many of the 54-inch Raymond piles—enough to support about 3,000 feet of the bridge—were built to a length of 164 feet, quite probably the longest ever used for a bridge in this country. The precast, prestressed deck slabs reach a span of 60 feet and weigh about 156 tons apiece, providing twin roadways, each 26 feet wide.

Much time, meaning much money, was saved by using these post-tensioned Raymond piles, even though they had to be barged for 200 miles from the yard in Mandeville, La. Incidentally, this yard was set up originally to fabricate the same type of Raymond pile for the magnificent Lake Pontchartrain Causeway.

It is this quality, derived from long experience and creative engineering ability, that Raymond offers as stock-in-trade. Foundations often present unusual problems and we are equipped to handle most of them, however large or small, on land or under water. May we be of help to you? Just call or drop a line to any of the Raymond offices here or abroad.

DESIGN AND SUPERVISION: Engineering Staff, Florida State Road Dept. CONTRACTORS: a joint venture of Brown & Root and T. L. James, Inc.

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Mack diesels get more jobs done in less time. Macks last longer, with less downtime —a most important consideration in the concrete-mixer field. That's been the experience of Denver's Pre-Mix Concrete whose B-61 Model Mack is shown here ready to deliver concrete on an addition to a sewage treatment plant in Aurora, Colorado.

MACK
for over 7 straight years
NO.1
by far in sales of diesel trucks

In Denver—concrete means Pre-Mix and Pre-Mix means MACK

Where there's big concrete work in the vicinity of Denver, chances are good you'll find Pre-Mix Concrete Co. and its fleet of Mack trucks on the job. Since buying its first Mack gasoline-powered six-wheeler, Pre-Mix has purchased over 50 more—the most recent being 10 diesel-powered units.

Why is Pre-Mix changing to Mack diesel? Because its Thermodyne® diesel engine operates on one-half the fuel costs of other trucks, hauling payloads of up to 30,000 lbs. over mountainous terrain with grades up to 12%, as well as on congested city streets. They average a legal 55 mph in highway travel and really get up and go in city traffic.

Other major Mack diesel advantages reported by Pre-Mix are greater dependability . . . far better performance . . . much less routine service . . . and complete driver satisfaction.

Mack has the right mixer or dumper for your operation, too. Ask your Mack branch or distributor for the names of satisfied operators, like Denver's Pre-Mix Concrete Co., who have discovered the economy and endurance of Mack trucks for themselves. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario. 7082

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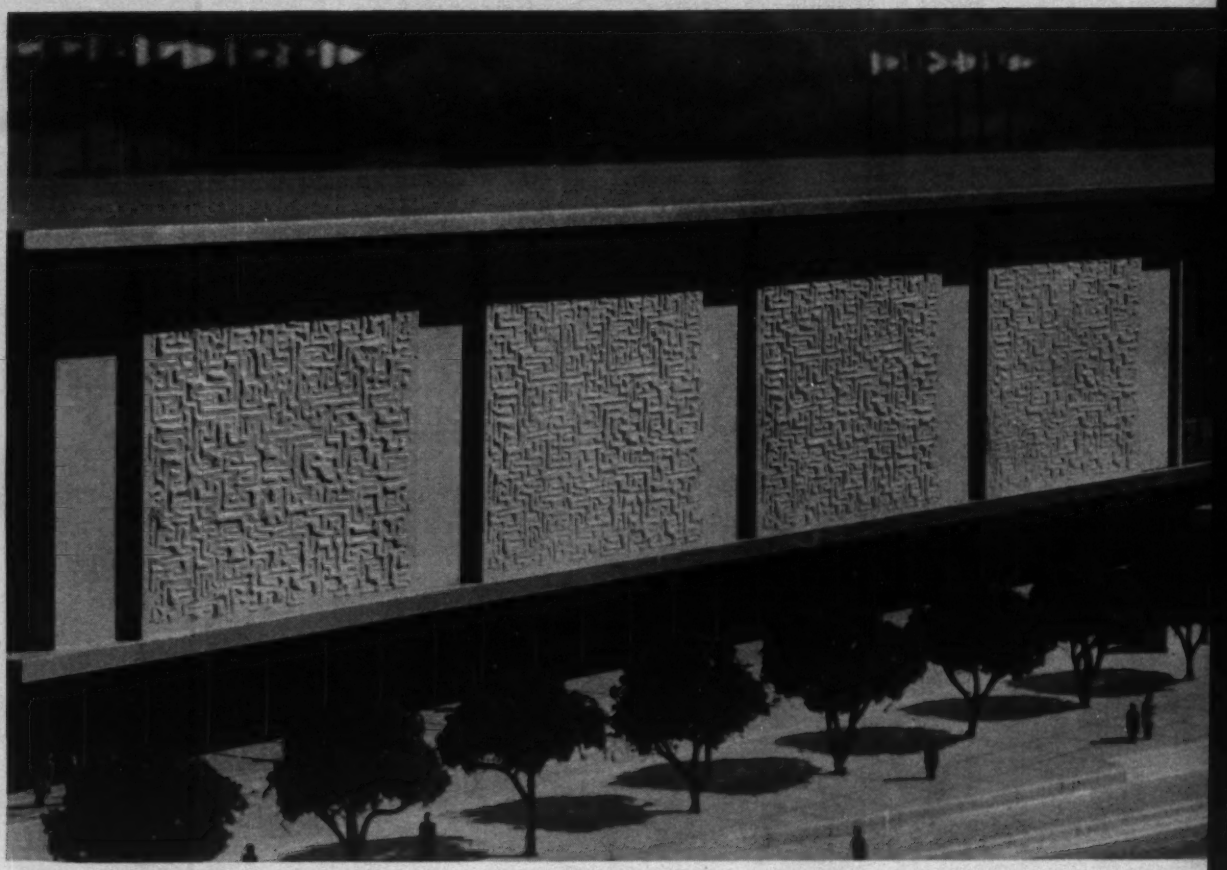


Steel Fabric reinforces sculptured precast concrete panels

Chicago's new Convention and Exposition Center gives you a lot to marvel at. For one thing, you could put Wrigley Field, Comiskey Park and Yankee Stadium under its roof. For another, it is spectacularly beautiful from any angle.

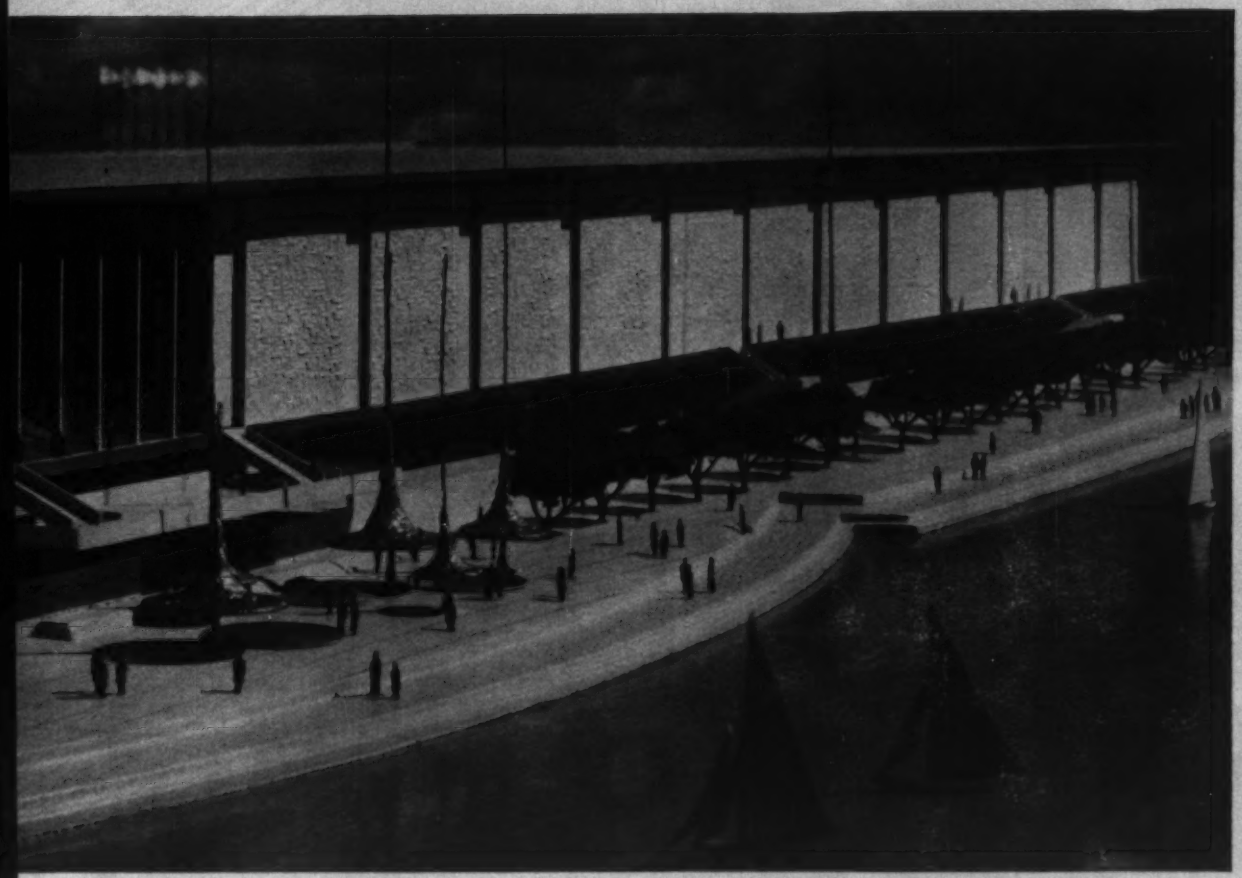
But only architects, engineers and contractors will fully appreciate how some of the ingenious structural and architectural effects were achieved. So, look closely at the photographs and don't forget the unusual sculptured panels are of precast concrete reinforced with USS American Welded Wire Fabric.

USS American Welded Wire Fabric was also used for concrete reinforcement of the pan-type floor construction. The floor is designed for 400 psi live loads with columns at 60-ft. centers. The joists are 14" deep with the top 4½" slab reinforced with welded wire fabric sheets. Welded wire fabric reinforcement was also used in the construction of the ground floor slabs, terrazzo floors and gypsum roof decks.

USS American Welded Wire Fabric is readily available in a variety of styles, sizes, lengths, widths and finishes—in wire gauges from 7/0 to 16 and with longitudi-

Rear view of a section of one of the precast reinforced concrete sculptured panels showing American Welded Wire Fabric, style 4 x 4—5/5.

This is front view of same section. Each 50 ft. high x 15 to 20 ft. wide panel consists of eleven of these sections in a vertical position.



in Chicago's McCormick Place Lakefront Exposition Center—

nal or transverse intervals of 2″ to 16″.

For more information on the advantages and applications of USS American Welded Wire Fabric, get in touch with our nearest Sales Office or write American Steel & Wire, Dept. 0478, 614 Superior Ave., N. W., Cleveland 13, Ohio. *USS and American are registered trademarks*

Credits: Chicago's McCormick Place Lakefront Exposition Center—23rd Street and the Lakefront. *Chief Architect:* Alfred Shaw, *Consultants:* Carl A. Metz, John Dolio, Edward D. Stone, John Root, Victor Hofer. *General Contractor:* Gust K. Newberg Construction Co. *Welded Wire Fabric Distributor:* Joseph T. Ryerson & Son, Inc. *Posttensioning Wire Tendons:* Joseph T. Ryerson & Son, Inc. *Precast Wall Panels:* American-Marietta Co., Concrete Products Division.

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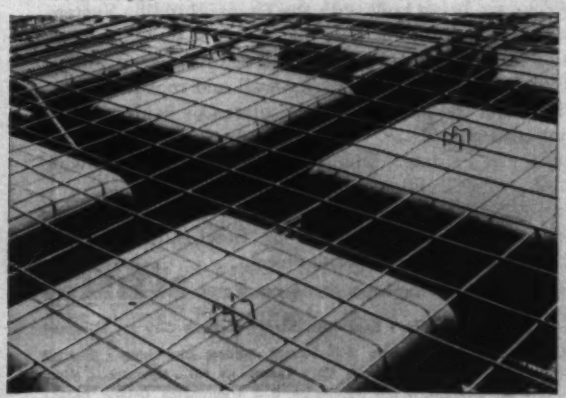
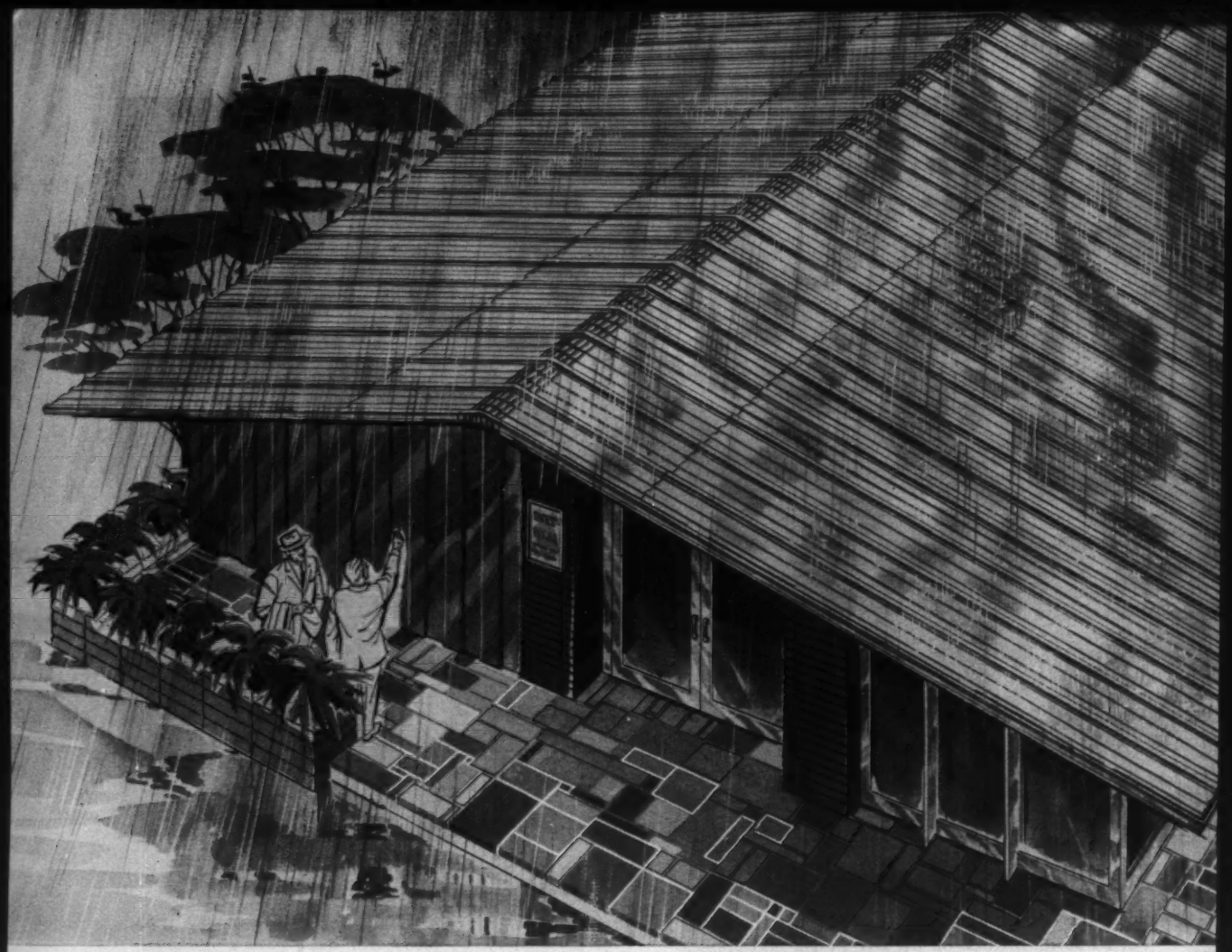
The cast-in-place pan-type reinforced concrete floor is designed for a live load of 400 psi.



Large sheets of USS American Welded Wire Fabric, style 6 x 6—2/2 used to reinforce the 4½″ thick concrete slabs are handled by two men.



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Reader Comment

Soils Not So Simple

SIR—We read the editorial "Keep Soil Types Simple" (ENR Aug. 25, p. 96) and agree that simplicity is an advantage. In his letter to the editor, Mr. Britzius expressed the view held by many testing laboratory personnel that the silt-clay fraction should be defined in terms of particle size (ENR Oct. 6, p. 8).

In fact, the main use of a soil classification system is to divide soils into convenient groups in each of which the soils have common engineering properties. In foundation engineering the significant engineering properties include shear strength, compressibility and pearmeability. The classification system will be most useful if soils are grouped in terms of these variables.

As research and experience have clearly shown, the significant properties of cohesive soils cannot be correlated with the percentage finer than 0.005 mm or other such dimensions. For example, natural deposits exist of material that is essentially all finer than 0.005 mm but with a range in plasticity index from nearly zero to several hundred per cent and with "significant" engineering properties in the complete range from essentially fine sand to fat clay. It has been repeatedly shown that the physical properties of cohesive soils are better correlated with plasticity (Unified System) than with grain size (textural system).

Mr. Britzius' statement that the Unified System does not allow "accurate" classification of the finer than #200 material is incomprehensible since there is no frame of reference for the term "accurate." Sedimentation theory clearly shows that the hydrometer analysis is anything but "accurate." The results may be reproducible perhaps but certainly not "accurate."

We commend Arthur Casagrande, the U. S. Bureau of Reclamation, and the U. S. Army Corps of Engineers for the development and use of the Unified Soil Classification System.

PROFESSORS ROY E. OLSON,
M. T. DAVISSON
Dept. of Civil Engineering
University of Illinois
Urbana, Ill.

(*Reader Comment continued p. 18*)

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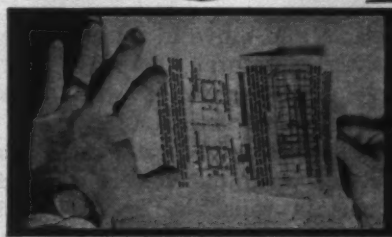

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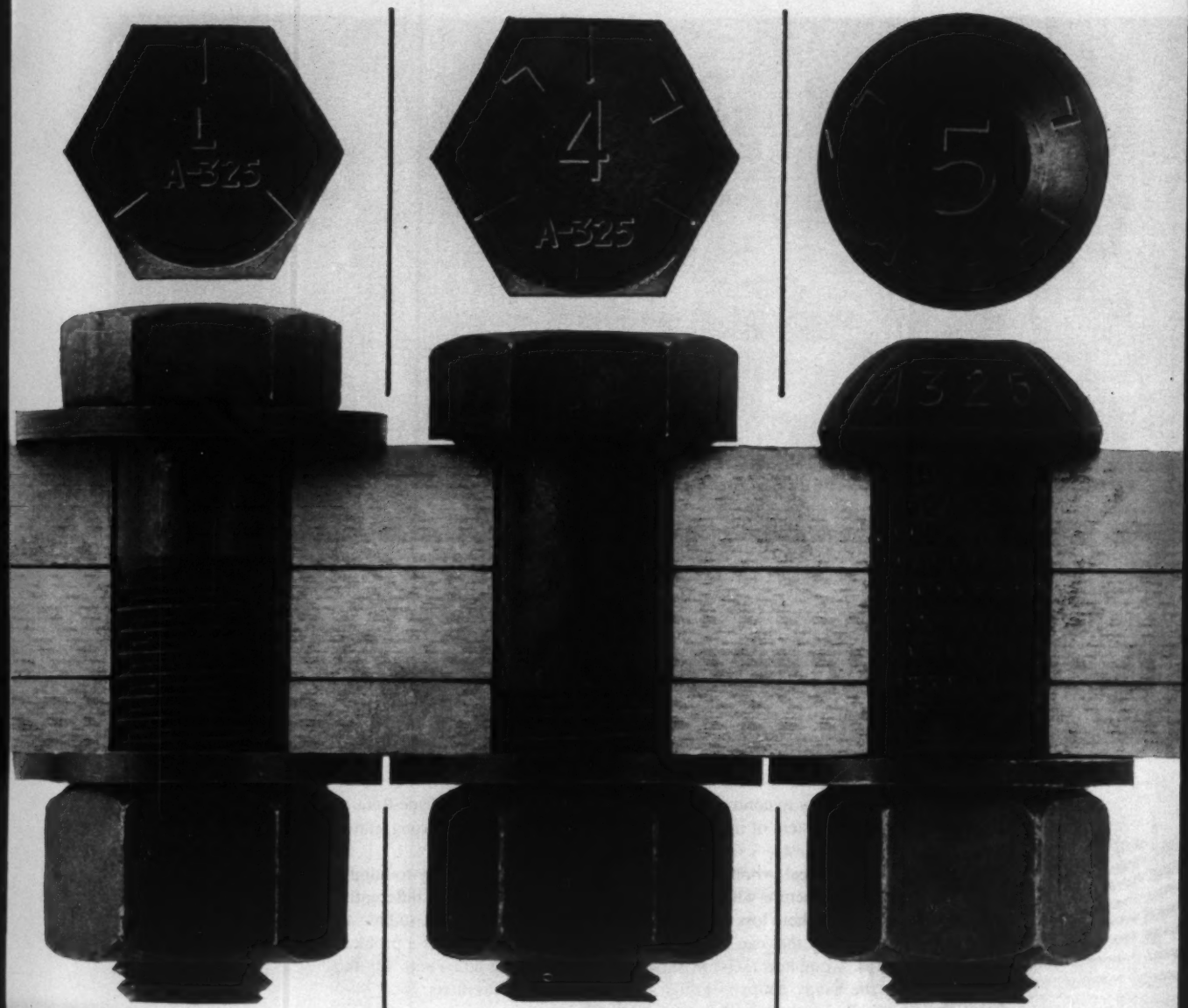


ORIGINAL HIGH STRENGTH BOLT
(a four-piece assembly)

Requires two washers, two wrenches or impactor sockets of different size. Offers fewest opportunities for "two-for-three" substitution in "bearing-type" connections, due to long length of thread.

Regular semi-finished head requires a washer to provide adequate head bearing area. No bolt length code number on head. Two-man bolt-up crew required.

NEW "STRUCTURAL" BOLT
(a three-piece assembly)

Single washer under head or under nut—whichever is to be torqued. Short thread is excluded from shear plane of members for "bearing-type" connections, except where thin outside parts are adjacent to nut.

Head clearance, stick-through, and minimum thickness of outside members vary depending on location of washer.

Larger heavy hex head does not require washer, unless head is to be torqued. Same wrench used for head and nut. Lamson "Structural" Bolts carry bolt length code number on head. Two-man crew required.

HIGH STRENGTH BEARING BOLT
(a three-piece assembly)

Only one washer required. Bolt drives easily, since knurls are ball-shaped, set in spiral pattern. In most grips, bolt can be "pulled" into place by impacting nut. Tolerates as much misalignment as smooth-shank, loose-fit types of bolts.

Closely controlled unthreaded body length reduces to a minimum the possibility of thread being in shear plane of connection. Greatest opportunity for "two-for-three" substitution.

Rivet-type head has about 35% more bearing area than new "structural" bolt head. Head clearance is constant, and overall bolt length is always 1/8" shorter than "structural" bolt length. Lamson High Strength Bearing Bolts carry bolt length code number on head. Can be assembled by one man.

New structural bolting specs approve increased allowables, recognize three types of structural bolts

New specifications by the Research Council on Riveted and Bolted Structural Joints, and endorsed by the AISC, now approve:

A. Three types of structural (ASTM A325) bolts.
   1. Regular semi-finished hex head bolt (original high strength bolt).
   2. Heavy semi-finished hex head "structural" bolt (new structural bolt with modified heavy hex head and short thread).
   3. Interference body bolt (Lamson High Strength Bearing Bolt).

B. Two types of nuts.
   1. Present heavy semi-finished hex nut.
   2. Finished hex nut (Grade 2H-ASTM A194 finished nut).

C. Round hardened washers.
   1. Round hardened washers are now ¼" smaller O.D.

D. Two tensile/shear allowables.
   1. A new tensile/shear ratio of 1.0:1.1 for Bearing-Type connections.
   2. The present rivet allowable of 1.0:0.75 applies to Friction-Type connections, and to Bearing-Type connections where bolt threads are in the shear plane of the connected members.

NEW TENSILE/SHEAR RATIO MEANS MAJOR COST REDUCTION

The new 1.0:1.1 ratio permits use of fewer bolts in *bearing-type* connections. As a rough example, *two* ASTM A325 structural bolts can now be used instead of *three* rivets, provided threads are excluded from shear planes. Major cost reductions are possible as a result of fewer holes, bolts, nuts, and washers—reduced layout and bolt-up time. Rivet allowables still hold for *friction-type* connections.

WHICH BOLT IS BEST?

Right now you have a choice of three types of bolts. (All are made by Lamson). The original high strength bolt may be "phased out" in the future—so your choice is really between the new "structural" bolt and "interference-body" bolts, such as the Lamson High Strength Bearing Bolt.

Certainly the new "structural" bolt improves upon the original high strength bolt. But the High Strength Bearing Bolt is an engineering breakthrough—not just a refinement—and as such, provides major advantages over other types of bolts.

Use of the Lamson High Strength Bearing Bolt results in stronger structures at no increase in cost.

BEARING BOLTS LET YOU TAKE FULL ADVANTAGE OF THE "TWO-FOR-THREE" SUBSTITUTION

The revised specification requires shear connections to be friction-type when:

1. Subjected to stress reversal, severe stress fluctuation, impact or vibration.
2. Slippage would be undesirable.

The High Strength Bearing Bolt fills the hole in initial bearing for maximum resistance to slip. Thus, connections that would be "friction-type" under No. 2 above, for smooth-shank bolts in loose-fit holes, are "bearing-type" *when Bearing Bolts are used.*

Therefore, using Bearing Bolts, the "two-bolt-for-three-rivet" substitution can be made in many more connections than with other types of bolts.

BEARING BOLTS EXCEL IN FRICTION-TYPE CONNECTIONS

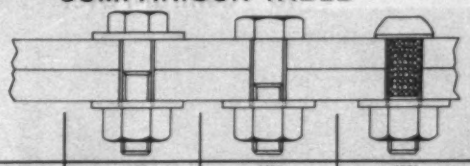
More than anything else, the specially designed knurled body is responsible for the Bearing Bolt's outstanding performance in friction-type connections in critical structures—including railroad bridges, mill buildings, ore buckets, process machinery, cranes, towers and radar antennas.

The Bearing Bolt's combination of body-bound fit and high clamping strength reduce to a minimum any possibility of movement between the connected members.

BEARING BOLTS EXCEL IN BEARING-TYPE CONNECTIONS

Why use High Strength Bearing Bolts in a "pure" bearing-type connection—where loads are static and not subject to stress reversal, impact or vibration? Even though the big advantage of the body-bound fit may not come into play, many engineers have said in so many words that *Bearing Bolts give them extra peace of mind.* Facts behind their thinking:

COMPARISON TABLE



	1932 High Strength Bolt	1960 Heavy Semi-Finished "Structural" Bolt	1958 High Strength Bearing Bolt
ASTM designation	A325	A325	A325
Comparative shear strength (⅞" dia. bolt)*	100%	100%	113%
Min. tensile strength requirements	90,000 to 120,000 psi	90,000 to 120,000 psi	90,000 to 120,000 psi
Source of strength	friction based on high clamping force	friction based on high clamping force	shear and bearing, plus friction clamping
Fatigue: Static / Dynamic	good / good	good / good	good / good
Resistance to slippage	good	good	excellent
Resistance to vibration	good	good	excellent
Best application	field connections	field connections	shop and field connections
Type of connections	all	all	all
Specific uses	buildings, bridges, towers	buildings, bridges, towers	buildings, bridges, towers, machinery, materials handling equipment
Men required to install (minimum)	two	two	one
Manpower	readily available	readily available	readily available
Time required to train men	one-half day	one-half day	one-half day
Method of installation	insert, hold head, apply measured torque	insert, hold head or nut, apply measured torque	insert, drive or pull, apply measured torque
Equipment required	hand wrench, impacter	hand wrench, impacter	impact wrench, maul
Washers required	two-heat treated	one-heat treated	one-heat treated
Installation cost	less than rivets	less than rivets	less than rivets
Shop painting permissible	yes, for static direct loads only	yes, for static direct loads only	yes
Maintenance	easily removed & reused	easily removed & reused	easily removed & reused

*Actual test results available on request.

Bearing Bolts have 10%-15% greater shear values, approximately 10% larger body bearing area. Close control of grip length on the unthreaded portion of the body assures excluding the thread from all shear planes in the connection, except for extremely thin outside parts adjacent to the nut.

While this advantage also holds true for the new "structural" bolt, the use of Bearing Bolts permits assembly of substantially thinner members free from this limitation.

For stronger structures—and extra peace of mind—specify High Strength Bearing Bolts.

PRICE AND DELIVERY INFORMATION ON ALL THREE TYPES OF STRUCTURAL BOLTS

U.S.S. Supply Division of United States Steel Corporation, exclusive stocking distributors of Lamson Structural Bolts, maintains 19 strategically located Service Centers throughout the country. Call the one nearest you for price and delivery information.

SAMPLE BOLTS, ENGINEERING DATA

Write Lamson & Sessions for (1) sample structural bolts; (2) up-to-date grip vs. bolt length chart; (3) a copy of the revised specifications for structural joints using ASTM A325 bolts; (4) any other application information required.

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WRITE FOR IDEA SHEET showing ways to convert your present equipment to the high production Dumpcrete method.

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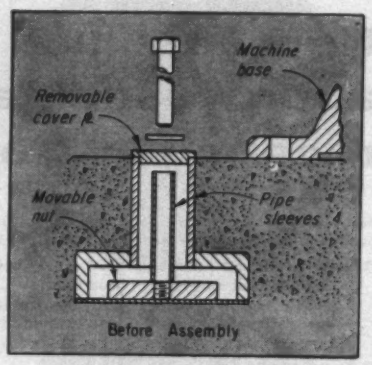

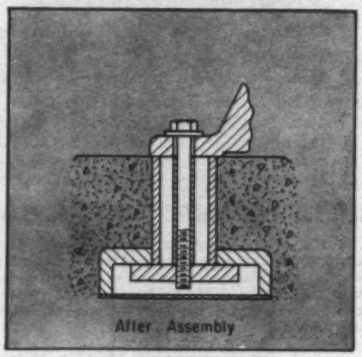

Adjustable Anchor Bolts

SIR—About two years ago you published an article describing the problems of installing machines properly (ENR Mar. 19, 1959, p. 148).

At that time I was working on the development of a new anchor bolt for fastening machines without the difficulties caused by the use of conventional bolts.

Your article expressed exactly my thoughts in this matter. It may interest you that I just have been awarded U. S. Patent No. 2952947 for my anchor bolt.

My anchor bolt can be adjusted perfectly plumb within a limited radius to allow for any inaccuracies in the layout of the mounting holes.

I don't have to elaborate on the importance of perfectly plumb installation. Only in this way can one make use of the full tensile strength of the bolt. Further, my anchor bolt when installed does not project above the floor level and does not create a safety hazard before it is used for future fastening of machines.

At the present moment I am discussing the possibility of manufacturing my patented anchor bolt with a number of companies in that field. I hope that it may be available to the trade in the not too distant future, the more as its development was caused by the urgent need for such an improvement in my own work.

PAUL WHITE
New York, N. Y.

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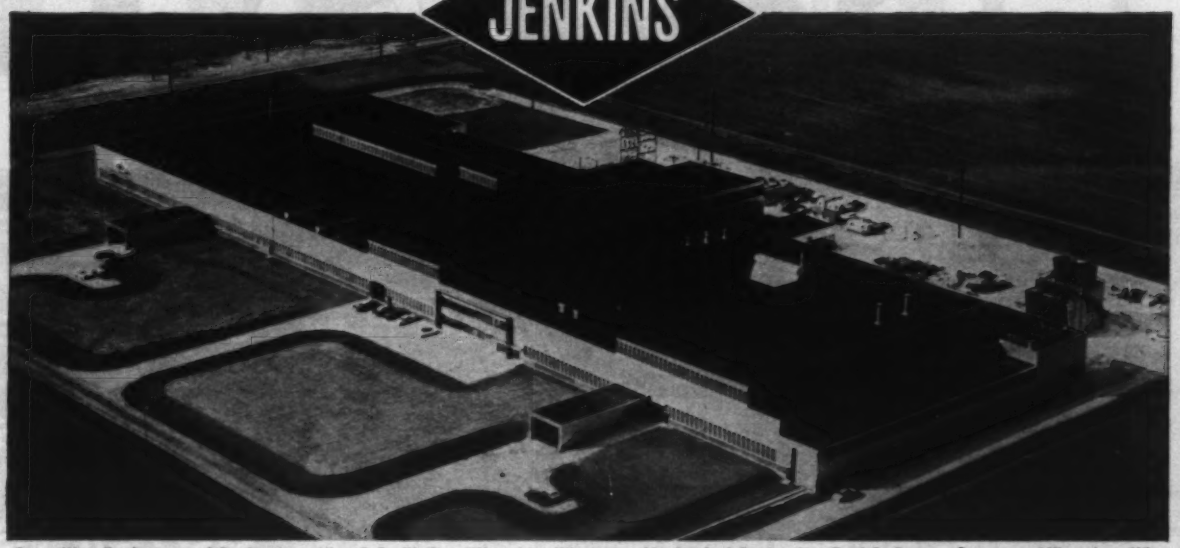
JENKINS



Consulting Engineers and Contractors: Klug & Smith Co., Milwaukee, Wis. • Mechanical Contractor: Paul S. Grunau Company, Milwaukee, Wis.

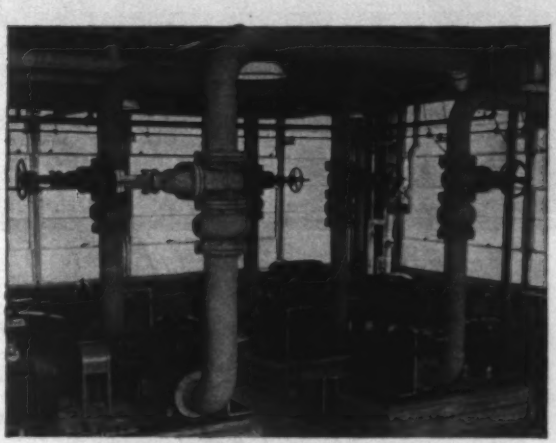
To control its 15 miles of piping Mirro chose JENKINS VALVES

With a trademark that promises the finest aluminum products, Mirro Aluminum Co. wanted the most trusted trademark in the valve world as an assurance of reliability for the complex piping system in its new $12,000,000 rolling mill in Manitowoc, Wisconsin.

There are over 15 miles of piping in this huge new mill that can produce 60,000,000 pounds of aluminum foil and sheets a year. But there will be no valve problems . . . no avoidable valve maintenance and replacement expense on these lines. Mirro made sure of that by installing Jenkins Valves throughout the system.

There's no point in gambling with valve problems when you can have the known reliability and trouble-saving quality of Jenkins Valves, without paying extra for the protection. Jenkins Bros., 100 Park Avenue, New York 17.

Sold Through Leading Distributors Everywhere



Jenkins Bronze and Iron Valves on lines in pump house for water cooling tower

JENKINS

LOOK FOR THE JENKINS DIAMOND

VALVES

JENKINS SINCE 1864 Jenkins Bros

meet the 14-B

SUPER

OUTLIFTS

OUTLIFTS

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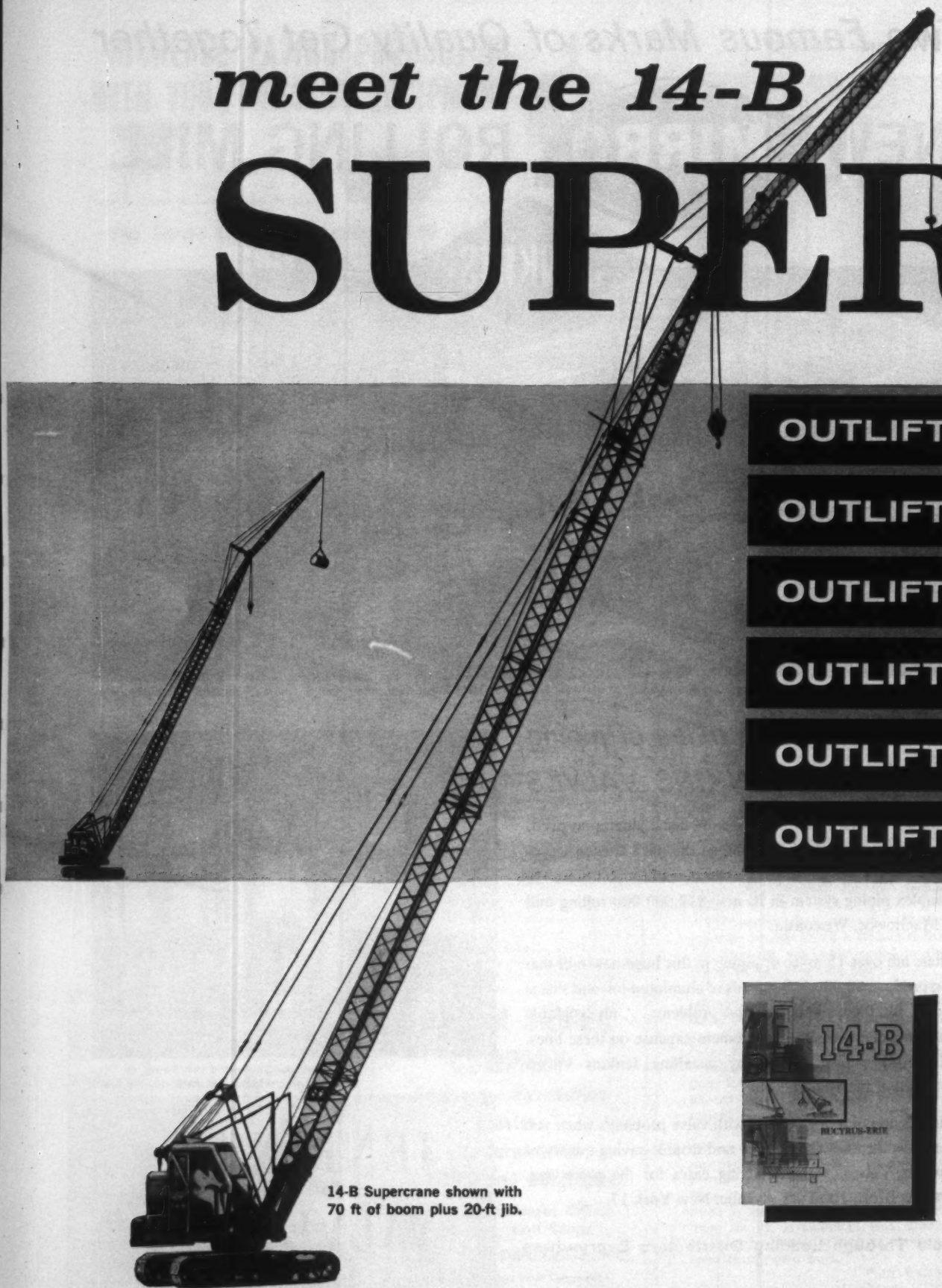

14-B Supercrane shown with
70 ft of boom plus 20-ft jib.

CRANE!

3/8-YD COMPETITOR "A" BY 19,250 POUNDS!

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1/2-YD COMPETITOR "C" BY 19,000 POUNDS!

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51E60

Check it! A Bucyrus-Erie representative will show you the facts — identify each of the comparisons above — present you with a complete, illustrated brochure describing all the startling new developments in the 14-B Supercrane or write Department COMPARISON, Bucyrus-Erie, South Milwaukee, Wisconsin.

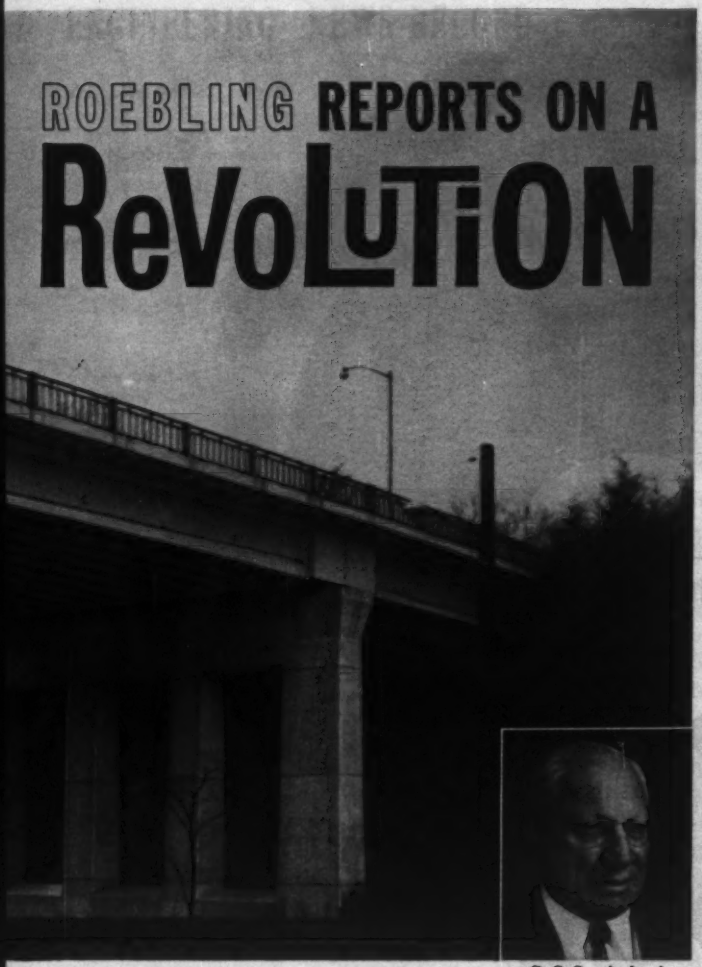
BUCYRUS-ERIE

1. Walnut Lane Bridge, Philadelphia, Pennsylvania. David M. Smallwood, Street Commissioner, City of Philadelphia, states, "The Walnut Lane Bridge, completed in 1950, represents the first major prestressed concrete bridge built in the United States and, as such, is the emblem of a thriving industry. We are proud to have this bridge in Philadelphia. It is an excellent example of economical, functional and aesthetic bridge construction. During the past 10 years it has required virtually no maintenance and we confidently expect that it will serve our citizens for many more years to come." The Walnut Lane Bridge was designed by The Bureau of Engineering, Surveys and Zoning, City of Philadelphia, assisted by Charles C. Zollman, then of Preload Enterprises. This latter firm was subcontractor for construction of the prestressed girders working under the general contractor Henry W. Horst Co. Stress-relieved wire, developed and produced by Roebling specifically to meet the requirements of prestressed concrete, was used for the first time on this project. The strength of this wire was considerably higher than any used previously.

2. Turkey Creek Bridge (prestressed block-beam construction), Madison County, Tennessee. First prestressed concrete bridge in the United States, built in 1949. Harley A. Baker, Engineer, Madison County Highway Department, Jackson, Tennessee, states that maintenance on this bridge has *cost nothing*. As for strength, loads as high as 40 tons cross the bridge frequently and, in the words of Mr. Baker, "The bridge takes these loads fine." Designed by Bryan & Dozier, Consulting Engineers, Nashville, Tenn. Built by maintenance forces under supervision of Edwin C. Rogers, Madison County Engineer. Engineering assistance on this bridge and tensioning materials were provided by Roebling.

3. Roebling Warehouse Floor, Chicago, Illinois. This was a Roebling research project set up in the very early days of prestressed concrete. Completed in 1946. As a test, half of this floor was laid in the conventional reinforced method and half in prestressed. Fourteen years of heavy reel handling have shown absolutely no signs of wear on

ROEBLING REPORTS ON A ReVoLuTiON



C. C. Sunderland
1878-1952

prestressed half while the reinforced half, with much less severe use, has required extensive repair. Roebling also produced the first precast prestressed concrete slabs in this country for the deck of the Lumberville Bridge, across the Delaware River. The prestressed deck of the Rio Paz Bridge in Central America was made by Roebling, who engineered all three projects mentioned here prior to 1950.

4. Football Stadium, Central High School, Fayetteville, Tennessee. Designer Ross Bryan of Bryan and Dozier, Consulting Engineers, had the idea that economical prestressed structures could be built in building blocks and used as concrete units. Carroll Strohm, President of Nashville Breeko Block Company, assisted in the research testing of prestressed block beams used here and in the Turkey Creek Bridge. Charles Lindsay, Fayetteville High School Principal, who supervised construction, states that during the 10 years that the stadium has been in use, "there has been no trouble with it whatever." Here again, Roebling furnished the tensioning materials used in the project as well as working closely with the engineers and designers.

These prestressed concrete structures are 10 years old ...They started something that is truly fantastic!

Ten years ago you could count on one hand the number of men in the United States who foresaw the possibilities of this remarkable construction method. In this short span of time their wildest dreams can now be regarded as cautious predictions.

Today, all over the country, prestressed concrete is being used for all types of structures by owners, architects, designers, engineers and builders. Office buildings, terminals, sports arenas, garages, stores, motels, piers, bridges and schools stand in testimony to prestressed's economy, strength, maintenance freedom, fireproofness and aesthetic values.

Much of this growth is due to the vision and untiring efforts of men in civic and professional life who immediately recognized the inherent values of prestressed concrete at first glance. The prime mover of prestressed in this country was the late C. C. Sunderland, former Chief Bridge Engineer of John A. Roebling's Sons Company. His fifty years with Roebling stands as a testament to exceptional ability, vitality and unparalleled vision. His faith in the prestressed method was borne out by the creation of a separate "Prestressed" division within the Company, named Construction Materials Division, just three years after the completion of the Walnut Lane Bridge, the first major prestressed bridge in the country.

The knowledge and experience that Roebling's Construction Materials Division has gained through these years is impressive. We will be glad to share with you data on design and erection, casting bed details, tensioning techniques and materials, and, of course, information on the finest prestressed strand available. For this, write Roebling's Construction Materials Division, Trenton 2, New Jersey.

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The purchaser of Lock Joint Concrete Pressure Pipe gets his first pleasant surprise at the reasonable initial cost of the product; his second at the ease and economy with which it can be installed. But long after the pipe has been buried and forgotten, it demonstrates even more graphically its saving ways. Because of the pipe's extreme durability, replacement costs are virtually non-existent. Maintenance requirements are so negligible that savings on repairs during the pipe's useful life span of more than 100 years may easily represent a substantial portion of the line's initial cost. Its permanent high carrying capacity cuts pumping charges to the bone and eliminates costly periodic cleaning of the line. In every way Lock Joint Concrete Pressure Pipe not only provides economies for the purchaser, but continues to pile up savings year after year, for generations.

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Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Semiannual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

EGYPT SAYS ASWAN'S ON TIME—Moussa Arafa, Egypt's Minister of Public Works, denied reports that Aswan Dam construction is lagging. Replying also to rumors of UAR-Soviet friction over slow progress, Mr. Arafa said there is complete accord between the two countries. Work has started on excavating the diversion canal, he said, and "almost 500,000 tons of granite will have been blasted from the canal" by the end of January.

THE SHOW MUST GO ON—The congressional committee bent on investigating the Port of New York Authority (ENR Sept. 1, p. 84) opened hearings this week despite a pending court action disputing its right to investigate. PNYA spokesmen call the hearings a "self-serving and one-sided 'trial'."

HEFTIER BRIDGES COMING—Some 4,500 of Pennsylvania's 21,500 bridges have a capacity of under 15 tons—a capacity that the state considers to be "hazardous." The highway department will therefore spend $150 million over the next 12 years in order to replace half of them.

NO NEED FOR COLUMBIA CHANNEL—The Corps of Engineers may drop further work on the stretch of Columbia River deep-water navigation channel that includes Bonneville Locks because nobody needs it. "My face is red and yours should be likewise," Brig. Gen. Allen F. Clark, Jr., told a group of shipping men who have always ballyhooed vigorously for the channel. The 27-ft-deep by 300-ft-wide waterway, which runs from Vancouver, Wash., up to The Dalles, Ore., has cost the Corps $9.5 million so far and takes $800,000 to $1 million a year to maintain. But only two ocean-going ships have reached The Dalles since Bonneville Locks were completed in the 1930s.

LOST GAMBLE—Money shortage is blamed for buckling and cracking of walls, floors and ceilings of the $1.5-million Justice Building in Little Rock, Ark., which is less than four years old. Architect Noland Blass, Jr., of Erhart, Eichenbaum, Rauch & Blass, Little Rock firm, says lack of funds made necessary omission of expensive footings that could have prevented the trouble. High-porosity clay reportedly heaves and drops as its moisture content varies.

THE PUBLIC IS WELCOME—Frough Corp., a heavy construction and development company in Bridgeport, Conn., became publicly owned last week with the sale of 135,000 shares of common stock at $10 per share. Another contractor, Del E. Webb Corp. of Phoenix, will go public this week or next. It will offer a package of convertible debentures, common stock and warrants to purchase common stock.

***61% of industrial floors are troublesome**

But all of them don't have to be— and Kalman can prove it!

That headline can be interpreted as being brash. We do not mean it that way. The fact is that far too many floors are troublesome, and the reason is, we believe, because far too many people do not realize there is a difference in concrete floors.

We do not mean to infer that we have the magical element which will end all industrial floor troubles, for floor troubles, we believe, will always be with industry.

Why? Because industrial floors are asked to absorb more severe use and abuse than any other portion of an industrial building. Under certain operating conditions, where floors are asked to serve purposes for which they are not intended, floors are bound to give trouble. You cannot, for instance, ask a concrete floor to be a giant drip basin for acids and expect it to stand up to the service without showing signs of wear and tear; it is not consistent with the constituent elements which go to make up such a floor. There are special floors for this type of service.

However, we can show a tremendous range of installations which provide trouble-free service despite trying operating conditions.

For example:

► There is a company in New England which has been spending $60,000 yearly for floor repairs because their concrete floors, installed by usual methods, could not stand up to the combined punishment of materials handling vehicles rolling over spilled abrasive grain. Our floors are standing up to that service.

► There is the Southern textile company whose original concrete floor was being softened and disintegrated by a constant oil spray. We resurfaced that floor and it is withstanding the service.

► There is the California paint manufacturer whose concrete floors in aisles have been worn out by truck traffic. We solved that problem, too, by resurfacing.

► There is the furniture manufacturing plant where even steel wheeled traffic fails to destroy our floor. True it is down to the aggregate after 13 years of traffic by 550 steel-wheeled trucks, but the floor is still solid as a rock. Other concrete floors would have started to disintegrate after the surface had been pierced. We think this company never had a problem because our floors were installed originally.

► There is the freight terminal in New Jersey whose floors are still in perfect condition after 30 years of service during which more than 20 million tons of freight have passed over the floor. This company never had a problem because they installed our floors originally.

► There is the nationwide food chain, whose floors take a terrific beating from towveyor traffic. The Kalman floors are easily distinguishable from other concrete floors because they are the ones that are trouble-free in the critical traffic areas.

► There is the photographic materials manufacturer where the concrete floors cannot dust because of quality control considerations. The floors don't dust because they are Kalman floors.

► There is the Southwestern manufacturer of soft drink syrup whose floors receive a variety of punishments ranging from scalding water to heavy vehicle traffic. The floors must maintain a showcase look for sanitary reasons and because visitors are shown throughout the plant. Despite the service, the floors shine because they are Kalman floors.

► There is the tobacco warehouse in the South where an old mastic floor impeded vehicle movement during the critical tobacco harvest season. Kalman resurfaced certain areas and now traffic flows smoothly.

► There is the manufacturer of highly toleranced machinery who has an unusual dual floor requirement: They must stand up to heavy traffic and they must look nice for employee morale purposes. Kalman red concrete floors provided the answer.

► There is the Mid-Western utility company which also had an unusual requirement. The floors had to be installed before its power plant was completed, which meant that railroad tracks had to be laid atop our floor later when heavy equipment was brought into the building. The floor beneath the tracks is a Kalman floor and able to withstand the service.

There are many, many more examples we could cite because we have specialized as contractors in this line of work for more than 40 years. But the point would be belabored. And that point is: There is a difference in concrete floors; Kalman floors can stand service that no other type of concrete floor can stand; they can make first-cost be last-cost and thereby eliminate all the profit-draining maintenance and repair expenses which are poured into the 61% of the nation's industrial floors which are troublesome.

There are adequate and valid reasons for the difference between our concrete floors and all others. We would be happy for the opportunity of discussing these reasons with you. We will be at Booth #823 at the National Building Exposition in New York City's Coliseum, Dec. 2 to 15. If you do not plan to be at the exposition, we would be glad to send detailed literature or a salesman. May we have that opportunity?

**Source of figure available on request.*

Kalman
FLOOR COMPANY INC

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Heavy-Duty, Moderate-Duty, Bactericidal Concrete Floors and Chemical Resistant Floors

WASHINGTON OBSERVER

• Construction spending outlook
Next year
Next decade

● **The outlook for federal construction spending in 1961 is coming into clearer focus** as work nears completion on President Eisenhower's last budget, which will go to Congress in January. To make the forecasts more easily understood here they are on a businessman's calendar year, rather than on the government's fiscal year, which begins on July 1.

Roads lead the list, increasing to $10.2 billion, up from a 1960 rate of $9.4 billion. That is federal and state combined. The biggest end of highway outlays will be for construction and for right-of-way acquisition.

Public works spending will go up a bit. The outlook is from $1.1 billion to $1.3 billion for Corps of Engineers and Bureau of Reclamation programs.

Military construction will decline a bit. The forecast is a drop from $1.5 billion to $1.3 billion. Reason: Accelerating of missile base construction won't equal the decline of bomber base building.

Public housing outlays will increase, from about $140 million to $155 million.

Urban renewal is up $45 million, too. Most is in payment to cities for completions, about 10% for new projects.

These figures show the trend. More precise forecasts will come once President-elect Kennedy presents his variations on Mr. Eisenhower's program. Mr. Kennedy's "New Frontiers" might well propose bigger programs, yet not increase spending very much in the calendar year of 1961.

—

● **A report out this week gives a longer-range prediction.** The President's Commission on National Goals predicts an increase in the national economy of from 3.4 to 5% in the decade ahead.

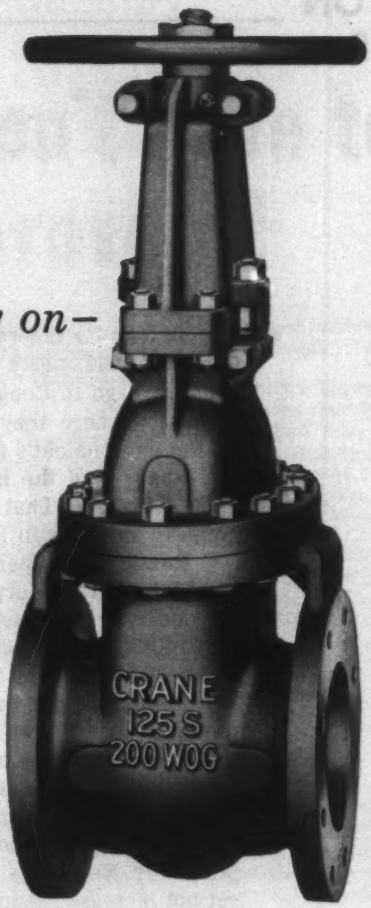
Sighting in on construction, here are some findings:

Education: "Annual public and private expenditure for education by 1970 must be approximately $40 billion—double the 1960 figure . . . Most of these funds must continue to come from state and local governments . . . (but) the federal role must now be expanded."

Health and welfare: "There should be more hospitals, clinics and nursing homes . . . Federal grants for the construction of hospitals should be continued and extended to other medical facilities." The report recommends federal scholarships for medical students and interns and a maximum research effort against mental illnesses, including a "substantial increase in the number of mental health clinics."

Economic growth: Increased investment in the public sector, the report says, is compatible with the goal of providing 13.5 million new jobs in the next 10 years. An overhaul of the tax system to provide incentives will be necessary to achieve this. "If Congress were to raise or lower tax rates more readily, stabilization of the economy would be facilitated."

The valves most plants rely on–



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gate, bronze trimmed.
Sizes 2" to 48".

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New Measure for 'Small Business'?

The Associated General Contractors of America appears about fed up with the Small Business Administration's policy on set-asides of government construction projects for small contractors.

In meetings with SBA Administrator Philip McCallum last week, AGC representatives began pushing for these two changes in policy:

- Revise upward the current definition of a "small business" contractor as one with an annual average volume of $5 million or less.
- Consider the dollar volume of subcontracting work going to small firms when analyzing where the federal construction dollar is going. Only prime-contract volume is considered now.

Here's the background:

SBA has congressional authority to set aside certain government construction contracts to insure that small businesses get their fair share of the government dollar. In pursuing its congressional mandate, SBA has established this working understanding with the Department of Defense: SBA automatically requests all projects of less than $500,000 be set aside for small business bidders; and SBA may, with the Pentagon's approval, request that certain larger projects be set aside.

For about 18 months prior to last August, the set-aside program had itself been set aside at the request of the Pentagon, which had complained of unduly complex administrative problems.

But last August SBA reinstated the program when it found that during the hiatus construction awards to small business had dropped by about 50%.

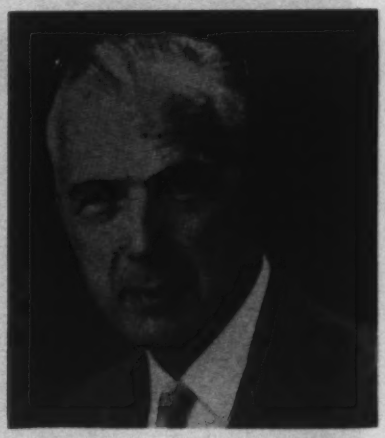
Since October, when the program actually started taking effect again, some $47 million in construction projects have been set aside for small firms. (It is still too early to tell, however, how many of these set-asides will result in actual contracts.)

What stirred AGC's long-standing dissatisfaction with the program anew was a recent situation at Sheppard Air Force Base, near Wichita Falls, Tex.

SBA requested, and the Corps of Engineers agreed, that a $4.5-million hospital project be limited to small business bidders. Advance bid notices carried the set-aside provision (ENR Nov. 3, p. 77).

But when contractors protested the setting aside of so big a job, the Corps withdrew its limitation on bidders. Then

PHILIP McCALLUM, SBA chief, has been getting an earful from contractors.



WILLIAM E. DUNN, of AGC, is pressing for changes in the set-aside program.

SBA protested—first to the Chief of Engineers, then on up to the Secretary of the Army, where the matter still rests awaiting final decision. (Another aspect of set-asides sometimes results in contracts going to other than the low bidder because the latter does not meet the small business definition. Recently, the Bureau of Reclamation awarded a dike construction contract to a bidder who was 2% above the low bid of $259,640 [ENR Nov. 24, p. 17].)

Last week AGC made it clear that even if its point of view wins out in the Sheppard AFB case, it will continue to press for changes in the set-aside ground rules. William E. Dunn, AGC assistant executive director, and Donald A. Buzzell, the organization's heavy construction manager, met with Mr. McCallum. As yet, Mr. McCallum has said only that he welcomes any facts the contractors can supply, and that all agency programs are open to re-examination and possible amendment.

Not only does AGC want to see changes in the application of the Small Business Act, it disagrees with SBA's interpretation of the law. The contractors maintain the law specifies only that small businesses get a proper share of government contracts, but does not make set-asides mandatory. SBA lawyers see set-asides as a definite requirement of the law.

The AGC is generally optimistic. Mr. McCallum has asked the contractors to spell out detailed proposals on the set-aside program, including a new definition of small business. These, presumably, will serve as a basis for further talks.

But AGC's optimism can extend only to January 20, when the new Administration comes in. Mr. McCallum, an Eisenhower appointee, will be replaced. The AGC may well have to start from scratch with the Kennedy appointee. A Democratic Administration would probably prove less receptive to any trimming back of the role of small business firms, which figure importantly in SBA's basic operation—lending.

SBA will point with pride to this record. Since the agency's start in September, 1953, it has approved 1,254 loans to construction firms for a total amount of $61.5 million as of last September 30. In the same period it received 2,946 applications for loans totaling $184.3 million.

During the July-September 1960 quarter, for example, about 153 applications for $11.4 million in loans were received from construction companies. The agency approved 53 of the requests for loans of $2.7 million.

According to Donald A. Hipkins, SBA's deputy administrator for procurement and technical assistance, the agency's record for all types of business loans over the past seven years is 21,288 loans made for a total of $1 billion. It has received 45,305 loan requests valued at $2.6 billion. And out of the total loans made, the agency says, the foreclosure rate runs less than 1%. This is a better record than that achieved by most banks, Mr. Hipkins says.

TUESDAY AFTERNOON: Workmen had erected 24,000 sq ft of this Harrisonburg, Va., manufacturing plant.

WEDNESDAY MORNING: As crews started work, the columns and roof collapsed.

Building Collapse Kills Five

Five construction workers were killed last week when 24,000 sq ft of precast, prestressed concrete—the start of a one-story, 11-acre manufacturing plant—caved in near Harrisonburg, Va. Three others were injured.

Cause of the collapse has not been determined. A crane operator said: "It seemed to start in one place and go down in a wave. It was over so quickly we didn't realize at first what had happened."

The building consists of 12x12-in. reinforced concrete columns 18 ft high with 34-in.-deep prestressed concrete I-beams spanning 40 ft across the ends of each bay. Double-T sections, 6 ft wide and 15½ in. deep, span 50 ft from beam to beam to form the roof deck.

The columns go over anchor bolts set in 6x6-ft spread footings. Levelling and locking nuts tie the columns' steel base plates to the footings. Above, prestressed beams run from top to top of the columns with the double-T sections above. In the final structure, embedded tab connections are welded. At columns, connections are also grouted.

Erection started just a week before the accident. Twelve bays in two rows of six were up. Wednesday morning, a crane and erection crew had placed the beam and three of six double-Ts for the first bay of a third row. They were just reaching for a fourth double-T when the building came down.

The owner, Walker Manufacturing Co., Racine, Wis., planned to have the entire 181,000-sq-ft structure up by January 2 in a total of just 34 working days. And their schedule called for completion of the plant in March.

There is no general contractor on the job.

The architect, Robert Carlton, Richmond, said that his firm held responsibility for the design but not for the erection.

Concrete fabrication and erection is by Concrete Structures, Inc., Richmond. Randolph Lacy, general manager, said: "Final connections had not been made. Temporary connections consisted of a weld between the angle set in the column top and the angle cast in the end of the beam."

Beam-column bearing was only two inches.

Mr. Lacy said: "The column-beam connections are new to us. They consist of an angle on the column top and an angle on each beam. Specifications call for a bearing minimum of 1½ in. and a maximum of 2 in. The purpose is to let the column steel extend up between the beam ends to their tops; when the entire connection is grouted, it would develop into a rigid-frame type of connection."

There is no building commission with jurisdiction over the project.

Concrete Structures, Inc. has retained a group of engineers to study the collapse. The group includes Ross H. Bryan, Nashville, Tenn.; Jack R. Janney, Des Plains, Ill.; and Thomas A. Hanson, Richmond, Va.

Coming: More Missouri River Dams

The Corps of Engineers is studying the feasibility of building two or three more dams on the Upper Missouri River.

They would be located in Montana on a 152-mile stretch of the river between the headwaters of Fort Peck Reservoir and Fort Benton, northeast of Great Falls.

Multipurpose to a limited extent, but primarily power producers, the projects would utilize the 375-ft fall in that reach of the river to develop an estimated 300,000 to 500,000 kw of power.

The proposed development would complete, for all practical purposes, the harnessing of the river for the full 1,354 miles between Gavins Point Dam—lowermost of the Corps' six main-stem dams—and Fort Benton, Mont.

There are two reaches between these points that have potential, but existing towns, highways, irrigation projects, and railroads make uneconomic any project that would raise river pools.

One such 77-mile reach lies between the headwaters of Oahe Reservoir and Garrison Dam. The other is the 227-mile stretch above Garrison Reservoir and Fort Peck Dam.

The program represents the last possibility for a big block of additional hydropower within the Missouri Basin, according to Wendell E. Johnson, Chief of Engineering for the Corps' Missouri River Division. Completion of the Bureau of Reclamation's Yellowtail Dam and the Corps' Oahe and Big Bend dams will wrap up the present Missouri Basin program.

Unlike the other powerhouses, the proposed installations would be free of seasonal influences. The existing power plants, with their tailwater discharging into open river, must be operated with the winter ice-cover in mind. If the ice-cover is disturbed, ice jams and flooding can result. Accommodating operations to this condition results in decreased power output in the winter, when the demand for power is highest.

All the new powerhouses will discharge into reservoirs instead of the open river, eliminating the ice problem. Therefore they would be able to turn out peak power in the period of peak demand.

The area that would be flooded by the proposed reservoirs is relatively undeveloped, with few towns, bridges, railroads or highways; thus relocations costs would be low.

The number of dams to be built is subject to the outcome of the studies, but initial thinking is in terms of two or three.

One area under consideration is underlain by Bear Paw and Pierre shales which created tough design and construction problems at Oahe Dam (ENR July 23, 1959, p. 42).

The $20,000 study was ordered by Congress in a resolution introduced by Sen. James E. Murray of Montana. The Omaha District Corps of Engineers is handling the study, expected to take several years.

Dambuilders Find 80-Ft Channel

Excavators working on the Corps of Engineers' Cougar Dam in Oregon made a geological discovery when they uncovered a buried river channel. Up to now the "find" has cost the Corps 11,900 cu yd of extra concrete. It is not yet known if the old channel will delay completion of the $24-million rockfill, scheduled for Mar. 1, 1963.

The channel ranges up to 80 ft in width and equally as deep in spots. Preconstruction exploration had revealed what appeared to be a number of deep potholes in the foundation gravels. These tests did not reveal that the potholes—most of them connected to form the channel—extended under the core area of the 445-ft embankment.

When excavation exposed the buried channel, construction plans were revised and the entire channel under the core was excavated and backfilled with lean concrete.

Merritt-Chapman & Scott Corp. is contractor for Cougar Dam, which will be the world's highest rockfill.

McGraw-Hill Dickering for Dodge

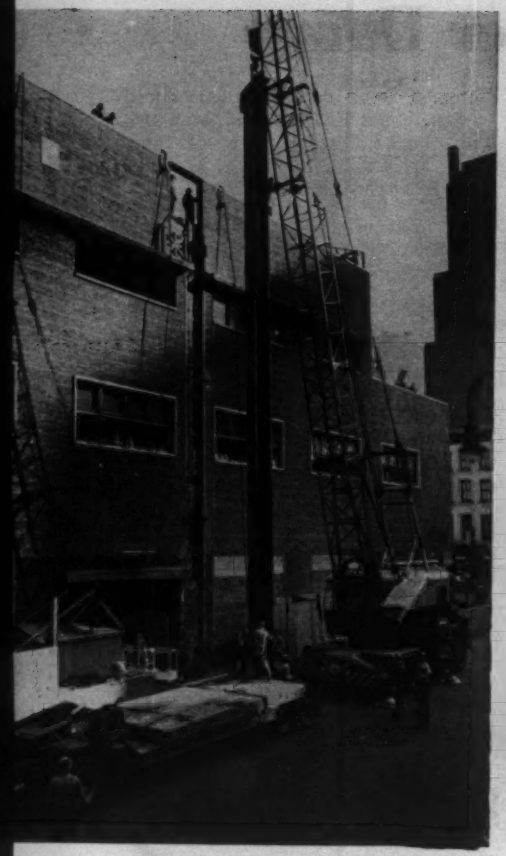
McGraw-Hill Publishing Co., Inc., announced this week that discussions looking toward acquisition of the F. W. Dodge Corp. are proceeding satisfactorily and an understanding is expected to be reached in the near future.

The F. W. Dodge Corp. is an old and well-established publishing company with headquarters in New York. Its principal properties are DODGE REPORTS, a daily construction-news service; DODGE CONSTRUCTION STATISTICAL SERVICE; and SWEET'S CATALOG SERVICE, which issues a number of catalog files of manufacturers' products. Other properties include ARCHITECTURAL RECORD, a professional monthly, and three commercial newspapers, DAILY PACIFIC BUILDER (San Francisco), THE DAILY JOURNAL (Denver), and DAILY CONSTRUCTION NEWS (Chicago).

Through a subsidiary, F. W. Dodge also publishes THE MODERN HOSPITAL, THE HOSPITAL PURCHASING FILE, THE NATION'S SCHOOLS, and COLLEGE AND UNIVERSITY BUSINESS.

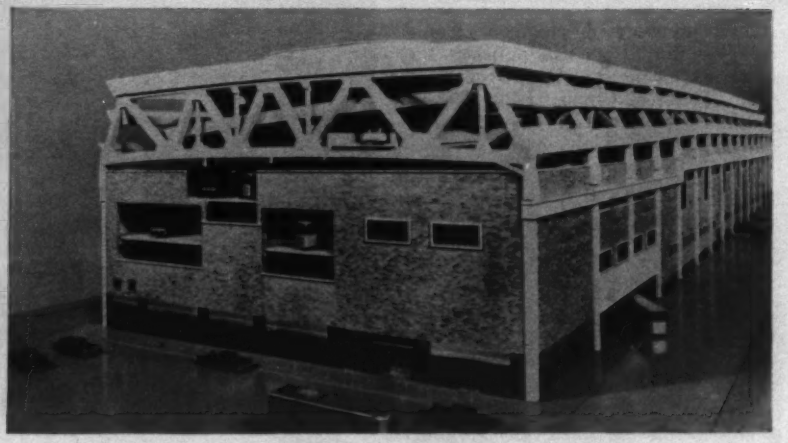
Details have not been fully established, but it is contemplated that McGraw-Hill will issue common and preferred stock for F. W. Dodge stock.

If the pending negotiations result in acquisition, McGraw-Hill plans to continue the F. W. Dodge business as at present. F. W. Dodge will operate from its present quarters locally and nationwide, and with the same staff.



Columns go up outside.

New decks will be independent of present building.



Three parking decks spanning over block-wide terminal.

Upstairs Straddles Downstairs

Steel crews last week erected the first of thirty 70-ft-long columns that will carry three added parking decks over the Port of New York Authority's Manhattan bus terminal.

The addition has the bridge designer's touch all through it. Decks will be carried by Warren trusses 50 ft c-c spanning 200 ft across the terminal. There's a fair amount of A242 steel in the framing, since weight is a major factor in the design. Steel columns, set just outside the existing walls, will make the addition independent of the existing terminal. And bridge cables attached to the bottom chords of the trusses will be pretensioned to carry part of the live load in the structure.

Though the new and original structures are separate, their foundations are combined. The new columns drop close to the existing building—separate footings for them would create unmanageable eccentricities at the bases.

Columns are the longest available from the mill—14WF320s with 1¼ x 23-in. cover plates.

The columns are tied into the frame of the existing building to provide stability only—there's no load transfer. They are held laterally across the building with 2¼-in. dia bolts tied to the webs of interior steel framing inside the existing column line. Longitudinally, a plate connects the new column web to the existing spandrel steel.

Trusses sit on 12-ft-high stems above the columns with pin joints at both top and bottom. Cast steel shoes at the top (they're ASTM A-148-55 steel) carry the 3-ft-long, 12-in.-dia truss pins. At one side of the terminal, truss motion is restrained with a brace from bottom chord to stem.

Harris Structural Steel Co., the fabricator and erector, will erect the trusses from front to rear of the terminal. Erection loads will go on the existing building's columns for the first two trusses, then Harris will put stiff-leg derricks on the truss tops and "walk" down the building, moving out over its own work.

Upper and lower parking decks will run on the top and bottom truss chords. The intermediate level will hang from the top chord—12 ft from the top, 14 ft above the bottom. Parking decks will be precast, prestressed concrete channel plank.

Eight bridge strands on each bottom truss chord will serve to reverse the direction of secondary stresses in the structure and to absorb a portion of the dead and live loads. They are all 2½-in.-dia high-tensile strands.

Stressing crews will put an initial force of 1,020 tons on the cables of each truss after the trusses and framing are erected.

The three added decks will increase parking capacity at the bus terminal from 450 to over 1,000 cars. Port Authority engineers originally planned the top level—now the roof—as an eventual bus deck with positions for a total of 60 buses at one time.

Work is being staggered over a 31-month period to avoid any disruption of operations in the terminal. Starrett Brothers & Ekens, the general contractor for the $20-million project, will handle work inside the terminal, including addition of 28 new motor stairs. New ramps for vehicles will run between the terminal and the Lincoln Tunnel. The expansion will be completed in 1963.

In this industrial building, EGSCO Metal Wall Panels in COLORGARD blend in with masonry and glass building components. The finished appearance of the building is well-suited to the suburban area in which it is located.

A jewel in any setting . . .
COLORGARD WALL PANELS BY EGSCO®

Industrial buildings can be attractive as well as functional when they are constructed with EGSCO Metal Wall Panels in COLORGARD. Sparkling colors in durable baked-on epoxy enamel combined with pleasing configurations permit the architect a wide range of design possibilities. In addition to being used for entire curtain walls, EGSCO Metal Wall Panels are easily adapted, architecturally and structurally, to other wall components of masonry, metal or glass.

EGSCO Wall Panels are available in aluminum, aluminized or galvanized steel or stainless steel depending on the application. They can be insulated or uninsulated . . . prefabricated or field-assembled. EGSCO Wall Panels provide strength with light weight and high insulating value.

Invisible fastenings and wall seams further add to the appearance of the finished building. Wall heights to 40 feet or more are possible without horizontal lap joints.

But the greatest beauty of EGSCO Metal Wall Panels is in their economy. Lower material cost and construction man-hours (the unique assembly design permits fast erection) provide savings all along the line. The result is a truly economical wall . . . structurally sound, durable and architecturally aesthetic . . . an imposing corporate image.

Consult Sweet's Architectural or Industrial Construction File for complete description and specifications on EGSCO Metal Wall Panels in COLORGARD, and other EGSCO metal building products.

Or consult the EGSCO sales engineering office nearest you.

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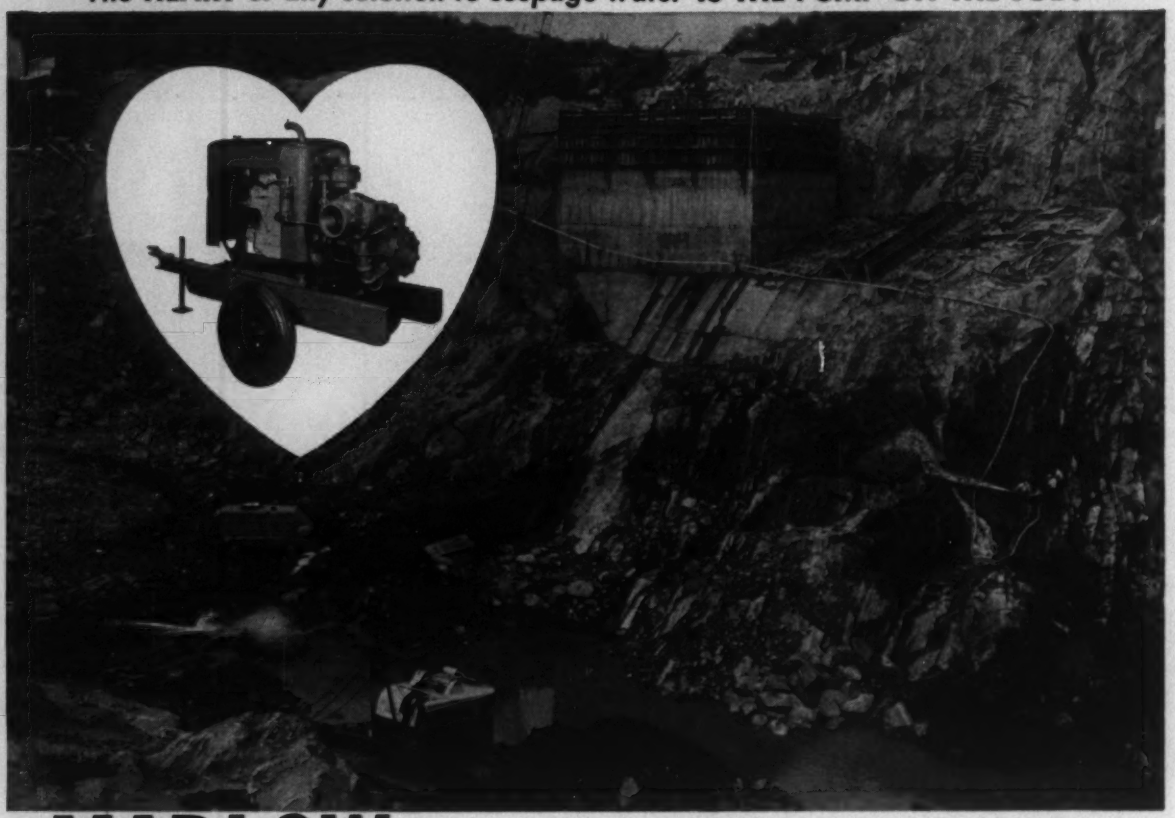
The **HEART** *of any solution to seepage water* **IS THE PUMP ON THE JOB!**



A Marlow high-pressure unit, almost a half-mile away, pumps water at 1,000 gpm to supply two jetting nozzles.

MARLOW

HIGH-PRESSURE SELF-PRIMING PUMPS . . .

cut costly delays on flood control dam!

A unique application for Marlow jetting pumps was on a $4,500,000 earth dam at Riverton, Conn. The dam, located on the Farmington River about 10 miles north of Winsted, is part of the flood control in the area.

The contractor used high pressure streams of water to work fines into the rock fill on the face of the dam. Two Marlows were used to supply water at 75 p.s.i. at the nozzles. These dependable Marlows pump 1,000 gpm at constant nozzle pressure, even when work was done at the top of the dam, 90 feet above the level of the river. As many as three of these 2-inch nozzles were used with the two pumps. Water drained down to a low point where a third Marlow was used for dewatering.

Marlow builds a complete line of AGC rated pumps and dependable Mud Hogs. Write today for Bulletin C-09 and the name of your Marlow dealer.

A two-inch nozzle mounted on a half-track saved time in moving the jet stream.

Marlow PUMPS

MARLOW PUMPS

DIVISION OF BELL & GOSSETT COMPANY

MIDLAND PARK, NEW JERSEY

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B-477

Blatnik Probe Turns to Florida

Congressional committee will try to find out what the contractor gained in return for "payola" to engineers

Rep. John A. Blatnik's congressional investigators will begin unfolding another expose of suspected corruption in the Interstate Highway Program next week.

The Special House Subcommittee on Federal Aid to Highways made headlines last spring with its inquiry into lax inspection and shoddy workmanship on Oklahoma's Skelly Bypass (ENR May 12, p. 21). Next week it will concentrate on Florida (ENR Nov. 17, p. 27).

Some 50 witnesses, including contractors, engineers and officials of both the Florida State Road Department and the U. S. Bureau of Public Roads, will be questioned during two weeks of public hearings in Washington.

The Florida disclosures will be "far more shocking" than those brought to light in the Oklahoma investigation, says Committee Counsel Walter May. "Widespread improper relationships" between contractors and highway department personnel will be documented.

The new inquiry will delve into two matters:

- Contractor payments to state road engineers.
- The disposition of buildings and other improvements on rights-of-way.

A Florida legislative committee and the State Road Department already have uncovered at least part of the scandal. They brought to light the fact that 13 state engineers received payments of $25 a week from Cone Brothers Contracting Co. of Tampa, with individual payments ranging from $275 to $2,150 over the past two years. A fourteenth engineer said he accepted money from another contractor—L & A Contracting Co. of Hattiesburg, Miss.

Committee staffers say they will show that the payments were slightly more widespread than the state inquiry disclosed.

But more important, they will try to find an answer to this question:

What, if anything, did the contractors get in return for their payments?

The implicated engineers asserted before state investigators that they never made concessions for any contractors, nor were they ever asked to. Representatives of Cone Brothers wouldn't say anything, and top officials of L & A disclaimed any knowledge of payoffs.

"But there must have been a quid pro quo in these payments somewhere, and we certainly intend to try to find out what it was," a Blatnik committee aide says. "We aren't sure we can come up with the answer, but it doesn't seem reasonable that payments on the scale passed out by Cone Brothers were purely for good will."

Part of the answer may come from new tests being run to determine whether construction done by Cone Brothers during the period of the payments was up to specifications. The tests are being made by the State Road Department with the Bureau of Public Roads and a consulting engineer for the state legislative committee on hand to check each phase.

Samples are being taken not only on the Cone Brothers projects in Florida, but also on all projects on which the engineers involved in the payola scandal worked.

Tests on two Cone Brothers projects in the Tampa area have been given priority in the hope that results from these will be available for the Blatnik committee during the forthcoming hearings. Results of most of the other tests will not be available in time.

Preliminary results from the two priority test areas indicated no major deviation from specifications.

Committee aides said the investigation of payments to state officials would be only a part of the hearings. However, right-of-way matters will get most of the attention. The committee is concerned over "windfall profits" reaped by a few contractors in instances of this sort:

The state, making use of 90% federal aid, buys up right-of-way, including improvements, for Interstate projects. But instead of the state salvaging the improvements and gaining back some part of the right-of-way costs, the contractor winning the grading bid is allowed to dispose of them.

Whatever income the contractor figures he can reap from the salvage is supposed to be reflected in his low bid. He then sells the improvements to a house-moving or demolition firm—often at a far greater "profit" than reflected in his bidding, the subcommittee believes. The moving or wrecking firm resells them—for another "profit."

The committee wants to know why the state and federal governments aren't getting these "profits" from right-of-way improvements they paid for in the first place.

In some instances, it was reported, contractors have sold houses on right-of-way back to their owners, who then had them moved to other property. There has also been trading in portions of citrus groves on right-of-way.

(*Turn the page*)

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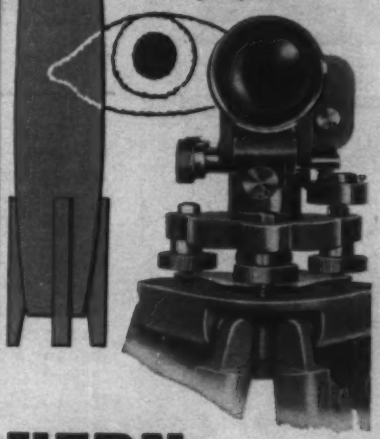

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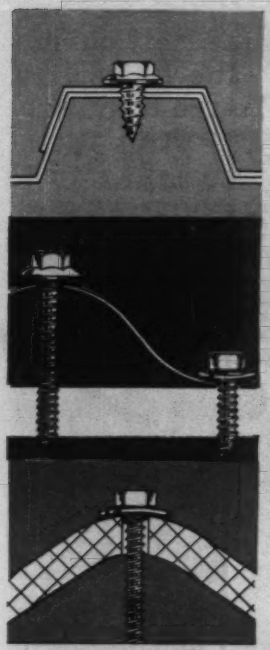

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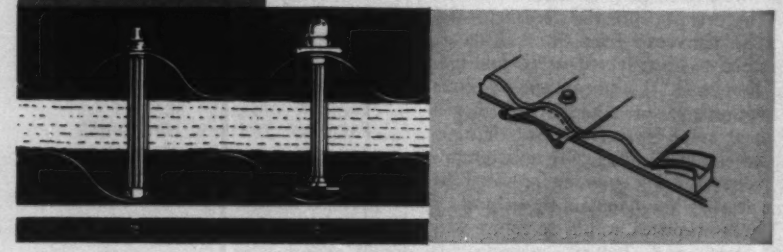

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In another case, a state engineer reportedly was given three houses on a right-of-way by the contractor involved.

In advance of the Blatnik group's hearings, the Bureau of Public Roads was confident that none of its personnel would be found involved in any payola or other graft. But it was bracing for a renewal of sharp attacks on its administrative controls over federal spending on highways—which runs to a total of $2.9 billion for the current fiscal year. Of that $2 billion is for the Interstate program alone.

If the congressional hearings reveal that state engineers allowed contractors to perform substandard work, the congressmen will want to know why BPR inspectors didn't catch this—particularly after the bureau's painful experience during the Oklahoma hearings. The subcommittee is likely to claim that the bureau should have obtained some assurance that state field personnel in Florida were dealing at arm's length with contractors.

The subcommittee also will want to know why BPR isn't doing a better job of protecting the federal investment in right-of-way improvements and using the return from their salvage to lower costs.

BPR will point out that it began cracking down as soon as the Florida scandal came to light—well before the Blatnik committee became interested.

It acted quickly to freeze payment of federal funds on Florida projects handled by Cone Brothers and the L & A firm. It halted payment on the right-of-way acquisition involving houses that went to a state engineer.

And it has been conducting its own investigation of both the payola and right-of-way matters.

The committee will use its Florida and Oklahoma hearings—and its claim that they have demonstrated a nationwide pattern of chiseling—as the basis for a plea to the new Congress to keep it going as a watchdog group.

The committee's future will be at stake when the new House of Representatives considers appropriations for its investigatory operations. There is little doubt, however, that the Blatnik group will be given a new lease on life.

The committee had hoped at the new hearings to get into roadbuilding practices in Georgia, New Mexico and West Virginia.

Its investigators already have worked up a sizable dossier of evidence from each state. It is also looking into suspected right-of-way malpractices in Massachusetts, and has a backlog of complaints from nearly every state. But these matters will have to wait until after the Christmas holidays.

The committee will ask for a much larger appropriation and a bigger staff than it has had for its "pilot studies."

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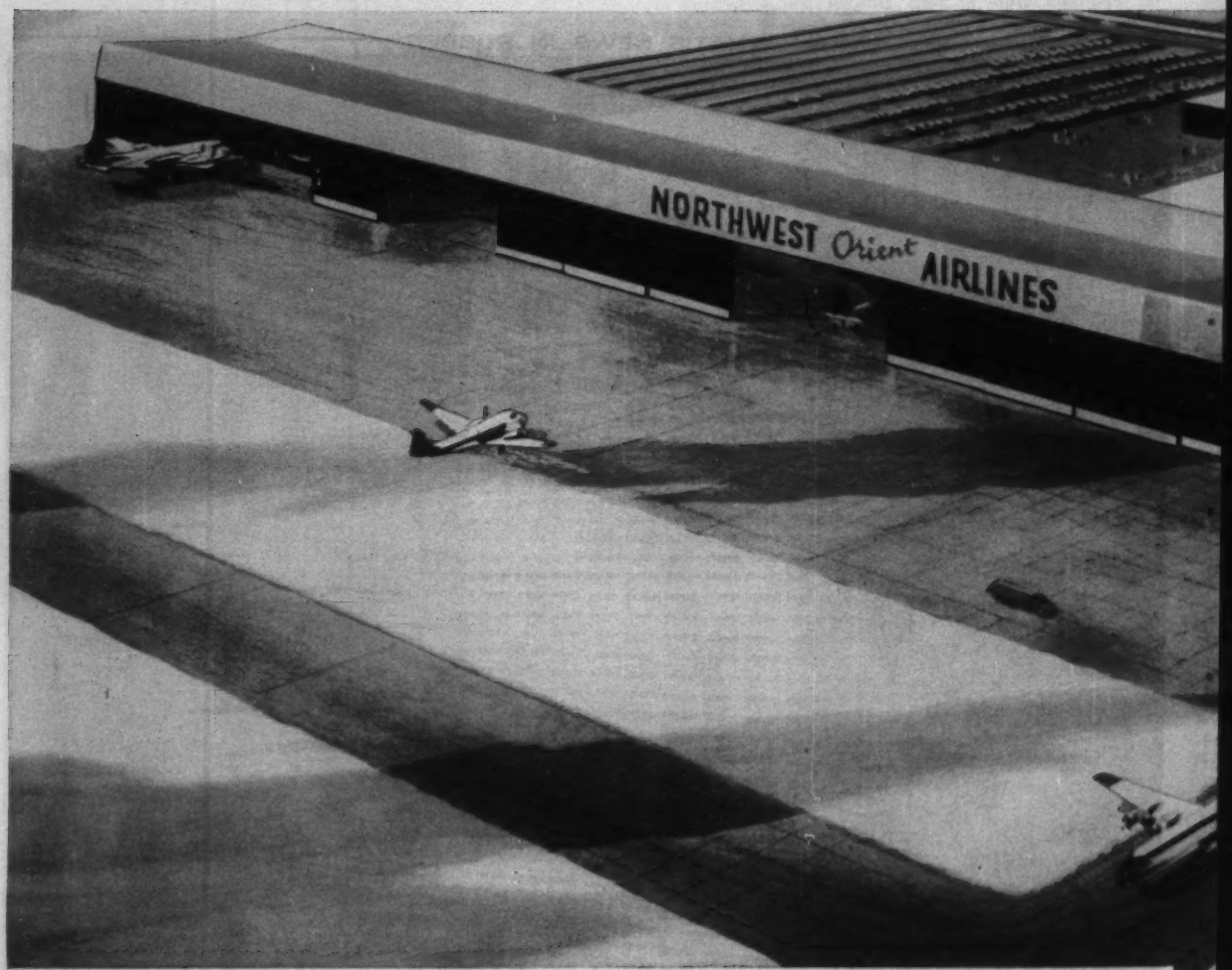

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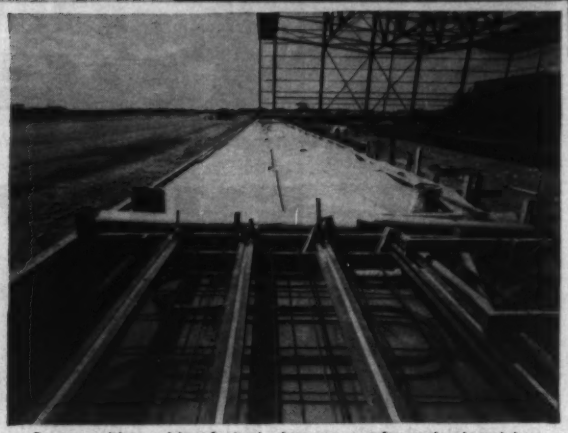

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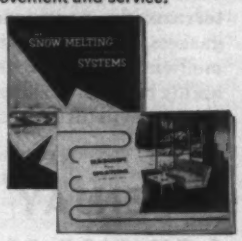

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Big Digging

Wyoming uranium mine is top earthmoving job

In a rush to mine uranium and get in on a government offer to buy it, Maco Construction Co. has an earthmoving job going in Wyoming that matches some of the biggest digging jobs in construction for equipment and production.

Millions of cubic yards of overburden are being removed to uncover uranium ore in the Gas Hills area, 50 miles southeast of Riverton, Wyo. The ore lies from a few feet below ground line to depths of 250 ft or more.

The big yardages of overburden call for big scrapers to make their pay loads up steep grades, and heavy-duty tractors for fast pushloading.

Power shovels, back hoes, tractor shovels and end-dump trucks usually handle the ore.

Maco's contract involves 20.7 million cu yd of earthmoving for Western Nuclear Corp.—one of nine uranium mining companies in the area.

The area being stripped is about 800 ft wide by 2,200 ft long and as deep as 300 ft. Haul roads out of the pit have maximum grades of 12%.

Maco moves about 325,000 cu yd of waste material per week on a 20-hour-day, six-day-week schedule. Its equipment spread includes ten 24-cu-yd scrapers and six 18-cu-yd scrapers. The big scrapers haul 21 pay-yards of the heavy, sandy material; the average for the entire fleet of 16 units is 18 cu yd.

The scrapers are push-loaded by four big tractors—three of them twin-engined —and two smaller ones. The tractors work in pairs and push in tandem. Average one-way haul is about half a mile.

The uranium ore lies from 200 to 300 ft below ground. To reduce the length of haul and to insure early delivery of the ore to Western Nuclear's concentration mill, Maco is excavating the 800x2,200-ft area in three pits about 800 ft wide by 730 ft long.

As soon as the waste material was removed from the first pit, shovels and dump-trucks began digging and hauling the uranium ore. Then, when the ore had been removed, the pit was filled with waste from the other two pits.

No estimates of the total volume of waste material to be removed this year are available. Last year, however, Maco removed nearly 25 million cu yd of waste material, and mined about 825,000 tons of uranium ore.

Total production of uranium ore in Wyoming this year will be about 1.4 million tons and should continue at about that rate through 1962, according to estimates of the Bureau of Mines' Division of Mineral Resources.

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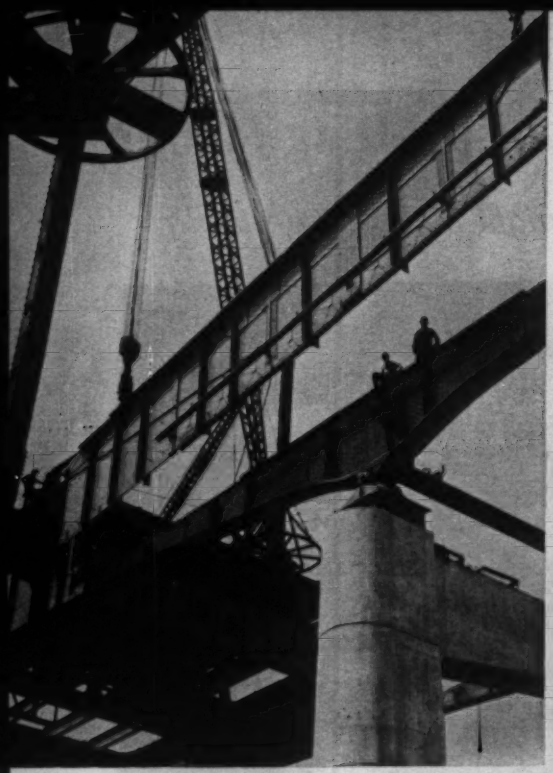
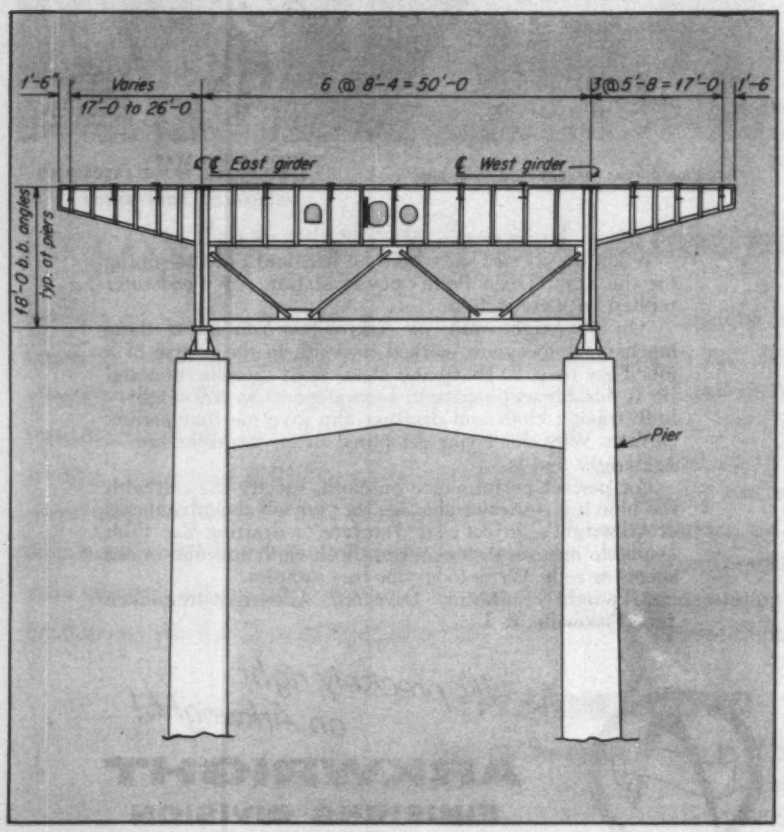


Cranes place upper girder section.

Stiff-leg derrick erects temporary inclined struts.

For Deep Girders: Horizontal Splices



Cross section shows twin girders, 18 ft deep at piers.

A new highway bridge over the Arkansas River at Little Rock incorporates continuous plate girder units 18 ft deep over the piers. Because of the great depth of the steel girders, and shipping restrictions, engineers called for horizontal splices.

And the horizontal splices—instead of being shop connections—were made in the field. The bridge comprises eleven spans. There is a main girder unit 1,581 ft long; two 63-ft long beam spans at the south end; and one 64-ft long beam span at the north end.

The grider unit consists of one four-span continuous plate girder structure on the south portion (spans 196, 210, 210 and 205 ft); a girder span 200 ft long, containing a suspended section; and a three-span continuous girder structure on the north side (spans 200, 200 and 160 ft).

Twin main girders are spaced 50 ft center-to-center; the floor beams are riveted plate girders and support eleven lines of stringers. The bridge carriers two 41-ft roadways, a 4-ft median strip and sidewalks.

Because the Arkansas River was inadequate for barge delivery of the steel members, delivery was made by rail to the south side of the bridge site. American Bridge Division of U. S. Steel Corp. erected the bridge from south to north.

(*Story continued p. 45*)

Mowlem and Milford Haven

In the deep water of Milford Haven Mowlems have just finished the second of two berths to take the world's largest tankers at the Esso Petroleum Company's oil terminal. They are connected with the shore by a jetty three-quarters of a mile long.

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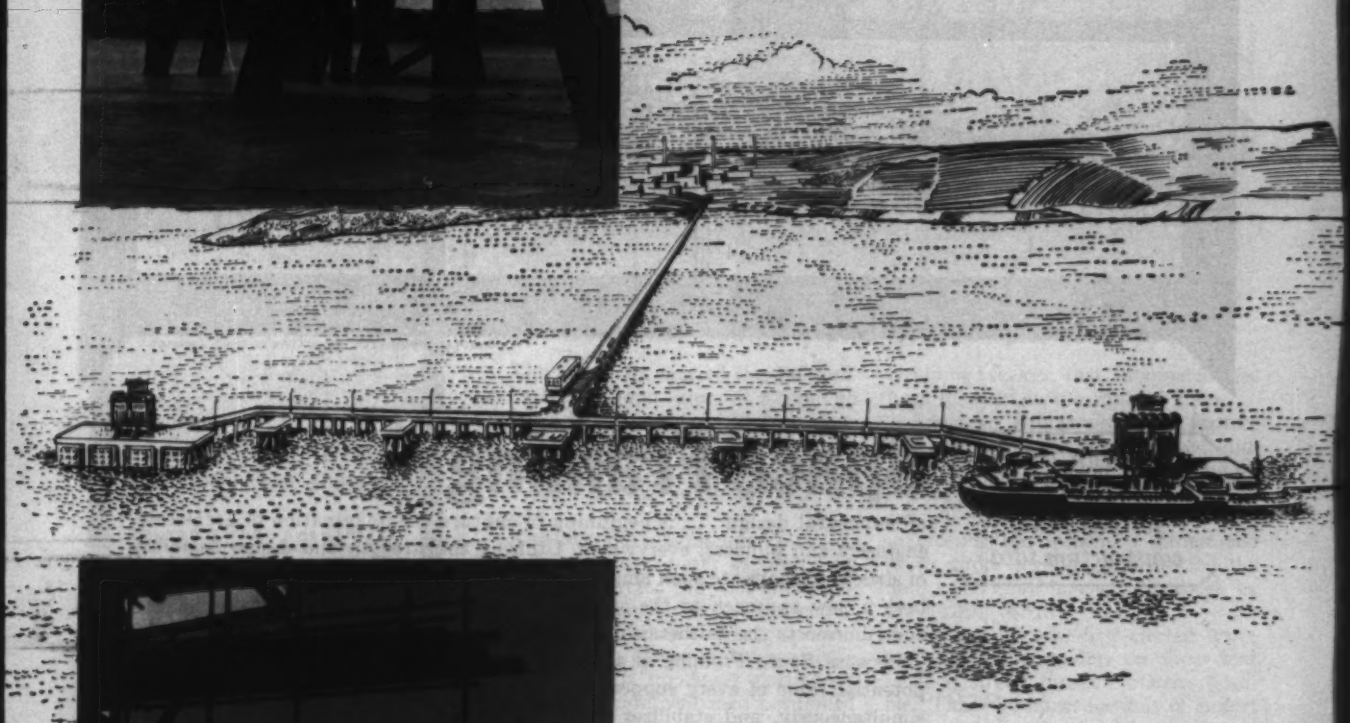

The longest (143 ft) pre-stressed concrete piles ever used in Britain were designed by Mowlems for Milford Haven (see photo at top). 10-ton hammers on 95-ft high piling frames mounted in Mowlems' own vessels were used to drive them.

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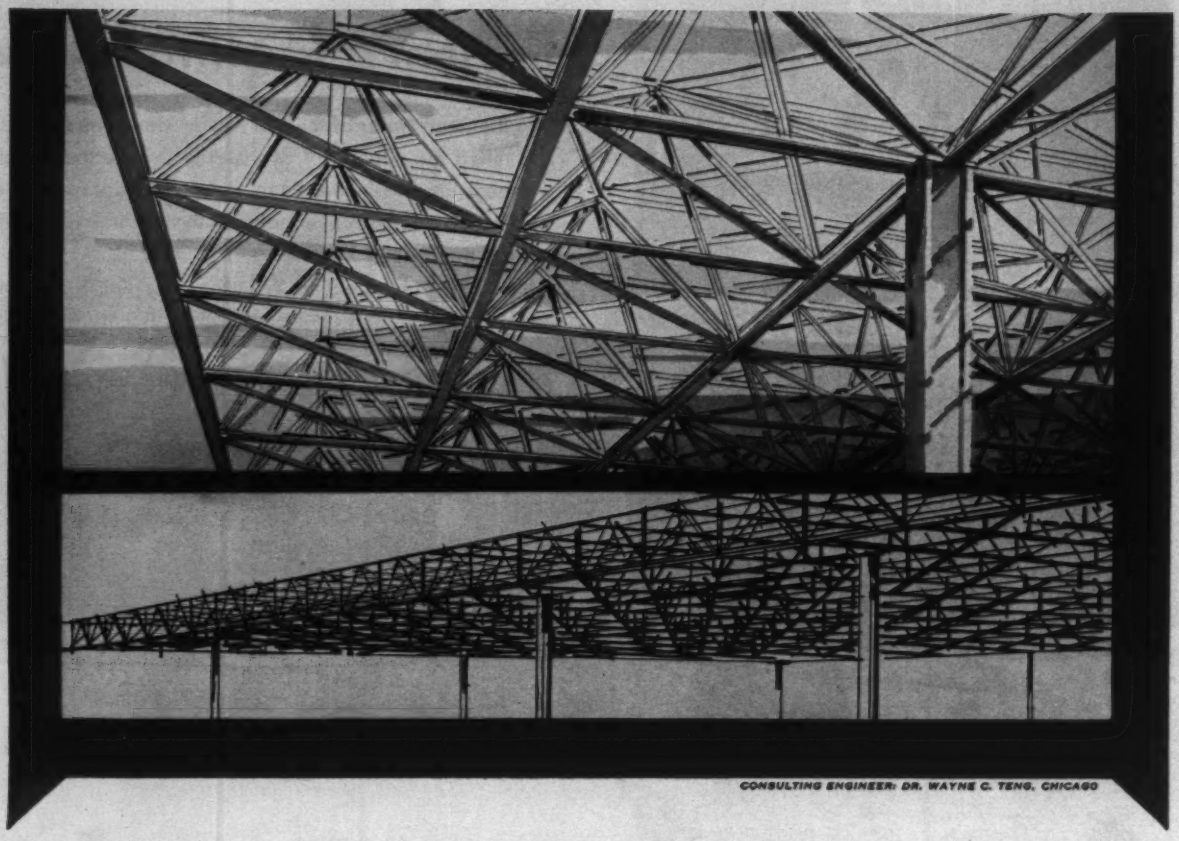

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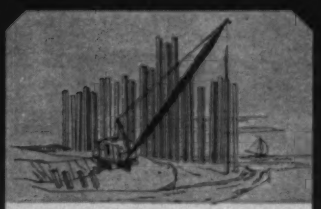

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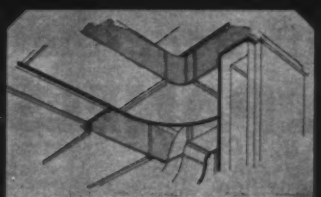

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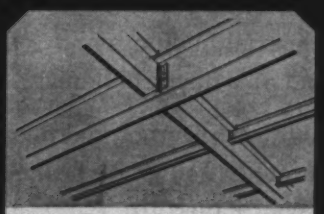

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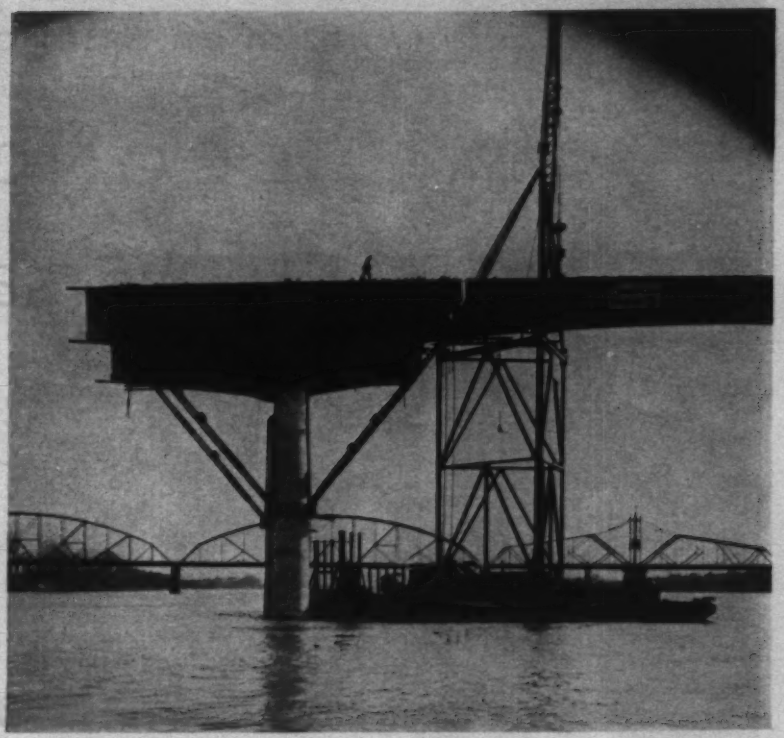

Suspended girder span is placed between pier sections.

The contractor erected the end girders with a 150-ton locomotive crane on the end bearings and a falsework bent. A 50-ton stiff-leg traveler derrick, previously erected on the south beam spans, was then moved northward on the girders.

A stiff-leg derrick—mounted on a 62-ft 6-in. triangular tower supported by two barges—erected the next girder sections by first placing each lower section on the shoe and then attaching one end to the portion of the girder previously erected. With the lower portion of each girder secure, workmen positioned the upper portion of the girder and made the horizontal splice.

The contractor's next step was to erect another stiff-leg derrick on the bridge girders between the south bank of the river and a set of railroad tracks. This derrick transferred steel from rail cars to work barges for movement to the erecting rigs.

To avoid both the cost and danger of conventional falsework in a river subject to rapid rises, swift current and excessive drift, American Bridge installed inclined struts on the piers to support the lower sections of griders over the piers.

After the upper pier section, floor beams and bracing were in place, the floating derrick erected the intermediate girder sections between the pier sections and the structure behind. The inclined struts were fastened with clamping devices that eliminated the need for bolts in the concrete piers.

American Bridge used the floating derrick to erect the bearing shoes, girders over the river and the minimum bracing needed for stability. The 50-ton traveler assisted the floating derrick in erecting the suspended girders and north girder sections, and erected the floor system and bracing not placed by the floating derrick.

The derrick boat first erected lower sections of pier girders on shoes and inclined struts, then all bracing possible. Then the upper sections of girders were erected and spliced to the lower. Stiffeners at floor beam locations were shipped full length, while intermediate stiffeners were field welded.

After the structure over the piers was erected, including floor beams and bracing, the intermediate girders to the south were erected by the derrick boat, splicing first to the isolated pier girders to the north, then to the continuous girders to the south.

Field connections were made with 1-in.-dia rivets; high strength rivets were used in main connections.

The Arkansas State Highway Commission is the owner. The structure was designed by Brown & Blauvelt, New York consulting engineers. For American Bridge, D. C. Kline, district construction manager, was in over-all charge. John R. Penry, superintendent, directed all work at the site.

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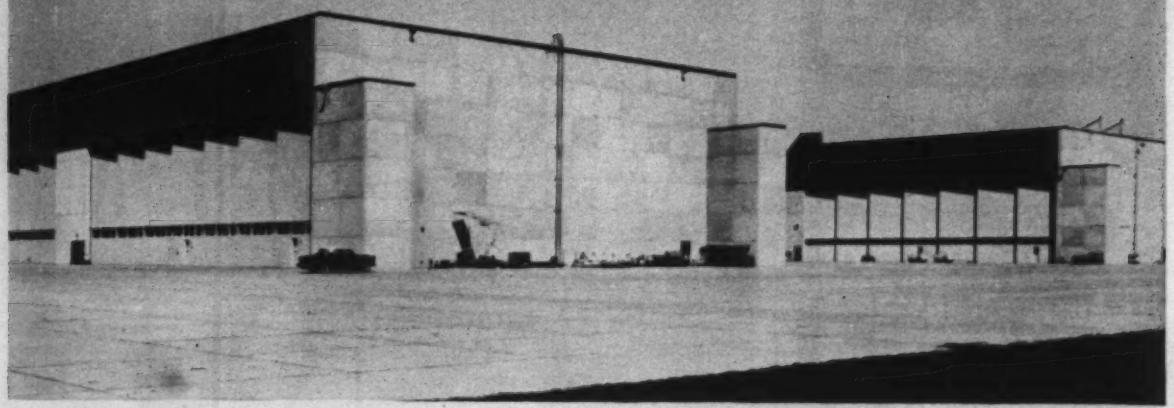

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Prize Pavements

State of Washington cites asphaltic concrete work

The Washington State Highway Commission last week presented awards for high quality asphaltic concrete pavement construction during 1959 to six Washington contracting firms.

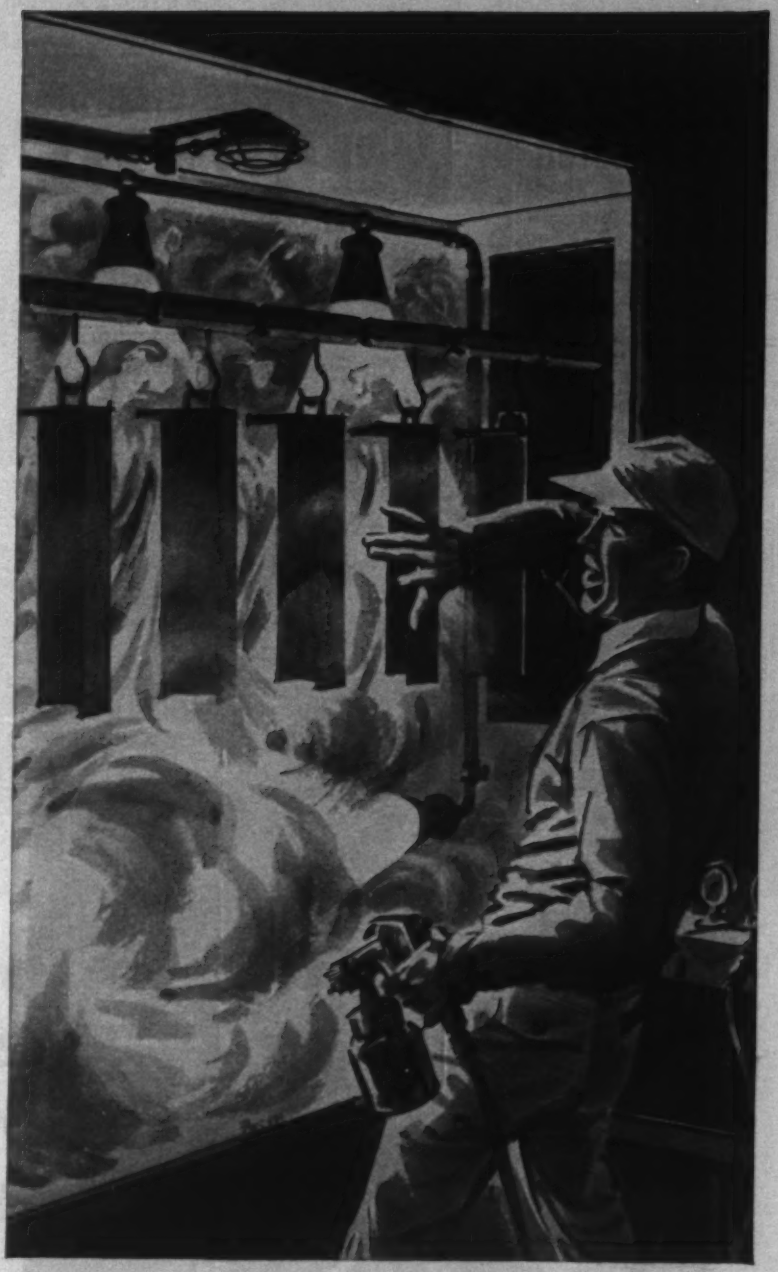
The two highest awards went to Associated Sand and Gravel Co., Everett (western region), and Dorman Construction Co., Vancouver (eastern region). Other award winners are Washington Asphalt Co., Seattle; Woodworth and Co., Tacoma; Asphalt Paving and Engineering Co., Tacoma; and McAtee and Heathe, Spokane.

The unusual awards program was developed in 1957 by the Highway Commission in cooperation with the Asphalt Paving Association of Washington, a contractor organization.

W. A. Bugge, Director of the State Highway Commission, explains that the object of the rating program is "to improve the quality of our asphalt pavement construction by stimulating the interest of contractors and their personnel in performing the best possible work. By placing emphasis on the features of construction that we believe need the most improvement, it is hoped that the greatest possible benefits will be realized."

Washington engineers developed their rating system after discussions with personnel of District VII of the California Division of Highways, where an over-all project rating program is in use. The Washington program rates each project involving construction of asphalt pavement, regardless of size of the project. A rating of 100 points is possible, and includes evaluation of these features of the work:

- Pavement roughness (40 points), based on results of roughometer tests.
- Roadway finish (21 points), determined by field inspection, taking into account profile, surface texture, transverse and longitudinal joints, pavement alignment, shoulders, slopes, plant site cleanup, and other factors.
- Inspection and control of materials (16 points), based on results of laboratory tests on control samples taken during the project, with emphasis on uniformity of aggregate gradation and asphalt content, conformity with specifications and mix design, stabilometer results, and field compliance with sampling and testing requirements.
- Traffic control and safety (4 points). Value is assigned after review of accident records and observations of project traffic control procedures.
- Prosecution and progress (16 points). Consideration is given to



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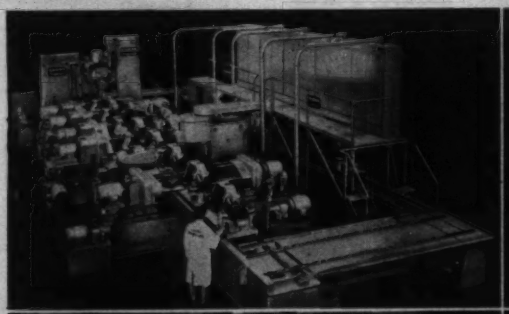
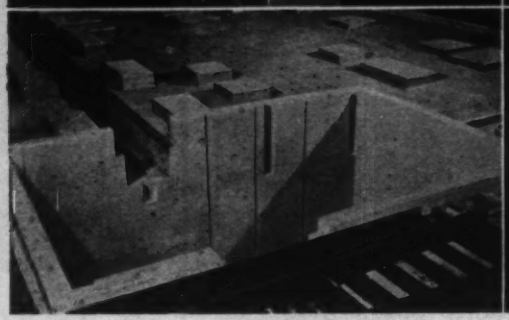


75-ton machine mounted upon 80 concrete piers permanently bonded by Weld-Crete to concrete floor base.



Shows some of 80 piers bonded to concrete base by Weld-Crete. Simple bonding replaced complicated forming, resulted in appreciable savings in installation of 75-ton machines shown above.

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quality and adequacy of the contractor's organization, supervision, equipment and attitude, as well as progress of the work.

• Complexity of project (3 points). The effect of various complicating factors—traffic volumes, interchanges and others peculiar to each job—is considered in rating this item.

Personnel of the construction and materials divisions of the headquarters office under direction of E. C. Simpson, Construction Engineer, and Carl E. Minor, Materials and Research Engineer, rate the projects. District construction engineers and resident engineers are consulted during the rating process.

Canada Looks for New Approach to Productivity

A top-level approach to the problem of productivity may be tried in Canada, where a National Productivity Council is expected to be formed. Plans for the council were announced by Prime Minister John Diefenbaker following a national conference on unemployment held in Ottawa last month (ENR Nov. 3, p. 80).

The proposed council would study and report on problems of productivity in relation to the country's general economic activity. Mr. Diefenbaker said he hoped the council would be useful in developing more efficient use of manpower, plant and resources to make Canadian products more competitive in the home and export markets.

The new organization would be composed of about 25 representatives of national associations of employers, labor federations, farm groups, universities and woman's groups.

It would be created by statute and its precise form and role determined by Parliament.

Under present plans, however, the council would be independent of government, although it would be provided with a paid staff at public expense for the first year of its operation. Representatives of the federal government and possibly of the provincial governments would sit in on the council meetings.

Uris-Rockefeller Expand Size of Planned Hotel

Uris Buildings Corp. and Rockefeller Center, Inc. have a third partner in their Manhattan hotel-building venture. They also have increased the size of the structure.

The building originally was planned to rise 38 stories (ENR Aug. 25, p. 81), but it now will be 45 stories. The new partner is Hilton Hotels Corp., which also obtained the agreement to manage and operate the hotel.

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ENR REPORT

Building New

New products—some of them just a hunch in a laboratory, others as yet undreamed of—provide the key to tomorrow's industrial building design and construction.

Today's plants for production of new products are relatively few compared to what's ahead. Industry has been increasing its investment in research and development continuously: Yesterday's trickle of new products is today's flow; today's flow will be tomorrow's flood.

In this report...

1. General Trends in Industrial Building Design p. 50
2. Impact of New Products on Factory Design p. 52
3. Buildings for Industrial Research p. 56
4. How Big Companies Purchase Construction p. 68
5. Studies of Unusual Plants for New Products p. 73

0 General

Changing economic conditions are bringing changes in industrial buildings. While newer plants follow most of the design trends established in the Fifties, there will be significant differences inside and out.

The most important influences on the pattern of industrial construction in the Sixties will be a greater flow of new products, expansion of the national highway system, new trends in the use of natural resources, changes in the labor force and rising incomes.

These already are bringing:

- A step-up in construction of facilities for producing new products.
- A shift in the geographic distribution of new industrial buildings.
- Greater emphasis on smaller, attractive plants.
- Changes in plant design favoring highly efficient production and shipping of new products.

Present economic trends indicate a brighter picture for industrial construction than at any time since the 1956 boom. While annual expenditures for industrial buildings during the next ten years can be expected to seesaw, as it has in the past, the amplitude of the upward and downward movements are likely to be much smaller and the general trend will be upward. Annual contract awards during the remainder of the Sixties should average between $3.7 billion and $4.0 billion, compared with this year's total of nearly $3.4 billion.

Current capacity and growth prospects suggest the following trends in industrial construction outlays for major industries:

- Nonferrous metals, instruments and machinery (including electrical) industries will step up considerably their

Plants for New Products

As demand for the products grows, the need for expanded production facilities will become more pressing. At the same time, the special environmental conditions required for production of many of the newer products will call for new directions in design and construction. Converting or expanding older facilities just won't do.

Because plants now being built for new products offer a significant clue to what will be needed in the future, this report analyzes present trends in industrial building design, examines closely the plants that provide special environments, and studies the new laboratories from which tomorrow's products will come.

The differences between conventional structures and these plants and laboratories indicate the types of construction that will face designers and builders in the future.

The general trends in industrial building construction are outlined on this page. The pages following concentrate on structures that are different. They focus on the new problems these structures are posing for designers and contractors, on the solutions to these problems and on the reasoning behind the solutions.

The design and construction problems coming to the fore now will recur more and more frequently in the next decade.

Trends in Industrial Building Design

expenditures for new industrial plants.

- Manufacturers of chemicals, paper and pulp, glass, rubber and cement are likely to spend at above-average rates for new plants.
- Food and textile producers may be expected to expand at about the average rate for all manufacturing industries.
- Expansion of the transportation equipment industry (railroads, shipbuilding, aircraft) probably will be modest.
- Major additions to automobile manufacturing facilities and petroleum refineries are unlikely in the near future. Of course, drastic shifts in consumer tastes or major scientific breakthroughs in key industries may change this picture. But even without breakthroughs, considerable pressure for expansion is building up because of the increasing flow of new products from industrial laboratories.

Industry is spending $9.6 billion for research and development this year and plans to increase its outlay for these purposes to nearly $11 billion by 1963. In that year, new products are expected to account for 12% of the sales of manufacturing companies. By 1970, more than one-third their sales will be in new products. As a result, an ever-increasing proportion of new industrial construction will be devoted to production and warehousing of items not currently produced.

Another key influence on industrial construction is the expansion of the national highway system, relieving industry's dependence on railroads for shipping of products. Plants now can be located along any highway route and be within reach of labor supply and market for goods.

Current contract awards already reveal the effect of this trend. Industry is building closer to its many markets, reducing shipping distances. Hence, more, but smaller plants are being constructed.

At the same time, the location of consumer markets has been changing. Migration of population from older urban centers to newly developing cities in the South and West is one factor. Rising incomes and redistribution of incomes are two other factors. Regions of the country that have traditionally lagged behind in income have been shifting gradually from agriculture to industry, with consequent increases in average income, thus opening new markets. As a result of these trends, the developing sections of the country are attracting more and more industrial buildings.

In general appearance, the newer plants follow the trends established in the Fifties. One-story buildings are still preferred for straight, horizontal production lines; but multistory structures are adopted occasionally, where gravity flow is desirable. In the interior, column spacing of 40 to 50 ft is not uncommon, to accommodate large equipment and for flexibility in use of space. For similar reasons, clear height in production areas generally is 16 to 18 ft. The long spans desired tend to favor steel framing. However, prestressed concrete has begun to make inroads.

Panel walls continue to be popular—precast concrete, aluminum, asbestos-cement, plastics and protected steel—but brick is making a strong comeback. No increase in use of glass for production or storage areas is apparent. Yet glass is often used lavishly for factory offices.

A more recent trend is toward greater use of color, coated panels or glazed brick being used for the purpose. This is in line with a trend toward better looking plants, for which there are several motives: Advertising and public relations value of an unusual or esthetically appealing building; to attract and hold labor; to obtain sites in desirable locations.

However, the biggest changes in the new plants are not always visible. For example, in general they tend to draw more electrical power than before and at higher voltages—incoming voltages of 13.2 kilovolts or more are supplied to many of the newer plants. This is in line with the trend to automation—remote control systems and electronically controlled production—plus the use of larger, more powerful equipment. In addition, distribution systems are becoming more complex, and emergency standby equipment as well as dual supplies are specified more frequently, to insure continuity of power supply.

Lighting levels in production and office areas are gradually increasing. But few plants equal or exceed IES standards; they average a little over 65% of IES standards for manufacturing areas and a little under 80% for offices.

Another significant difference in the newer plants is the closer control of interior temperature, humidity and air supply. Many more plants than previously are air conditioned—for employee comfort, of course; but often a more important motive is control of product quality, and in some cases, safety. The latter is particularly important where dangerous gases or radioactive materials are involved. Plants for new products are especially apt to have closely controlled conditions, as the following articles indicate.

CONTROLLED CONDITIONS—proper temperature, humidity and lighting—are essential for production of precision products.

WINDOWLESS WALLS are preferred for controlled-conditions production,

New Plants Spur Search for New

By S. A. Littmann

In this time of unusually rapid development of new products and techniques, architects and engineers have been confronted with a variety of new problems. By and large, we have met and solved these problems by adaptations of conventional methods and by putting to use some of the newer developments of the building industry.

• **Eliminating heat and noise**—Such products as jet engines require new installations in manufacturing plants and testing and fabrication facilities. For testing of jet engines, temperature and pressure conditions such as those encountered in flight must be simulated. At the same time, the structure in which the testing is done must be capable of withstanding the tremendous temperatures of the jet exhaust and must protect operators and occupants of adjacent property from the high noise levels.

In general, we have handled the acoustic problem with conventional sound attenuation devices, generously applied, and the heat problem by cooling with ambient air in combination with water sprays. The reduced pressures of the upper atmosphere are obtained by using the jet engine under test to evacuate the test chamber, while the reduced temperatures are achieved with conventional refrigeration equipment, multistaged for greater efficiency than would result from single-stage equipment.

• **Rigid environmental control**—Manufacturing facilities for precision equipment, such as jet engines, inertial guidance systems and electronic instruments, generally require precise control of temperature and humidity in the production area. A further requirement of a dust-free condition must be met for portions of these manufacturing plants. This requirement has given rise to the development of so-called "white" rooms.

These rooms are provided with double or triple-filtered air and protected with dust-locks, which blow dust off personnel entering the room, collect it, and dispose of it. They are maintained under high pressure relative to surrounding spaces to prevent dust from entering through the cracks or joints in the structure. Floors are covered with nondusting material, and walls and ceilings have hard finishes to permit easy washing.

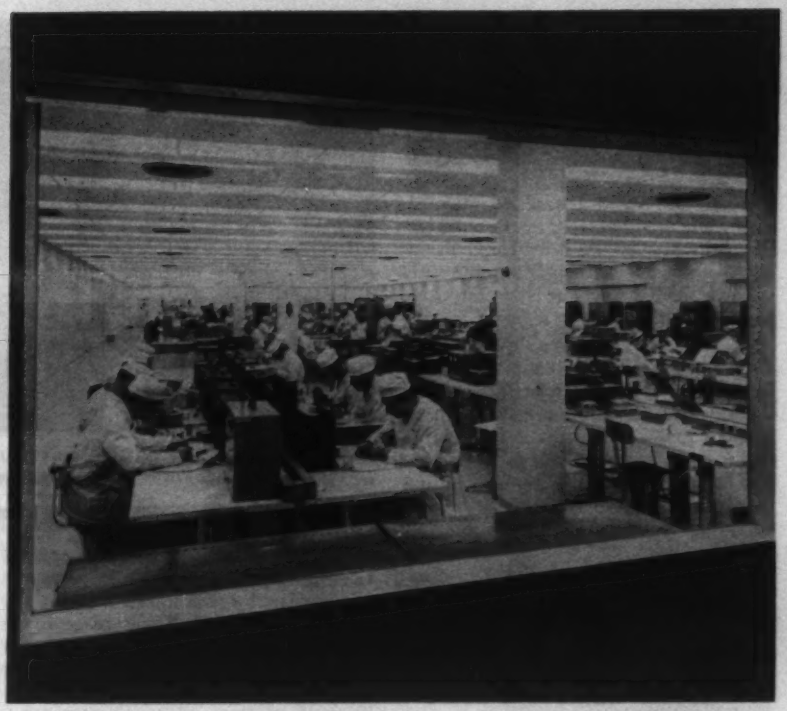
Low humidities are provided to inhibit rusting of highly finished ferrous surfaces. In general, these results are achieved by the unconventional use of conventional building materials and air-conditioning apparatus.

At Lear's new inertial guidance systems plant in Grand Rapids, for example, ultra-clean rooms are air conditioned by means of a central fan system with three sets of filters. The first consists of throw-away glass-fiber media, the second of high-efficiency strainer-type media, and the third of an "absolute" filter media.

The fan is installed upstream of the second filter bank, so any leakage in the ductwork handling filtered air will be outward. All heating and cooling coils

Mr. Littmann is chief mechanical engineer of Giffels and Rossetti, Detroit architects-engineers long noted for their work in the industrial building field.

but the office section of the plant usually has windows.



WHITE ROOM—an enclosed area inside a plant—is used for products requiring a dust-free atmosphere. Floors, walls, ceilings are surfaced with nondusting materials.

Ways to Control Environment

are on the pressure side of the fan, for similar reasons.

Refrigeration is by two reciprocating compressors of 45-, or 50-ton capacity, each supplying two direct-expansion cooling coils. To obtain the required low humidity without frosting, the coils operate at 32F evaporating temperature, under control of an evaporator pressure-regulating valve.

The rooms are maintained at a pressure about ½-in. water gage above that of the surrounding plant. The uplift due to this pressure has to be considered in designing the airtight ceiling for these areas.

• **Maintaining low humidity**—To assure proper functioning of sensitive electronic equipment, such as SAGE (Semi-Automatic Ground Environment) computers, humidities lower than can be attained with orthodox air conditioning are required. For such installations, less conventional approaches are required, such as the use of continuously circulated, regenerated and chilled liquid desiccants.

For the SAGE computers at Kingston, N. Y., for example, the desiccant is ethylene glycol, which is sprayed over coils in the air supply to the computer cells. The coils are supplied with chilled water at 45F, thus cooling the supply air at the same time as moisture is absorbed by the glycol solution. This solution then is pumped to regeneration equipment in another building, where it is heated to drive off moisture. A heat exchanger in the supply and return lines to the equipment preheats the moisture-laden solution and precools the concentrated solution for greater thermal efficiency.

• **Handling "hot" stuff**—Developments in nuclear research, atomic energy, and isotope technology have brought with them problems of protection from radiation hazards, waste disposal and containment. With these problems, the best approach has been to use modifications or combinations of techniques that have been effective in related applications.

Liquid wastes and reactor cooling water are treated by demineralization, flocculation, clarification, filtration, or combinations of these processes. Shielding is accomplished with sheet lead, massive concrete, earth, or simply with distance, depending upon the nature, extent and type of radiation hazard involved. Room interiors where radioactive materials are handled are finished in such a manner that they can be washed down (in some cases with strong reagents) in the event of a "spill."

Protection of personnel working with radioactive or exceedingly toxic materials is achieved by enclosing machine tools and "hot" materials in a "glove box." The box has ports so the operator can observe the interior, and rubber gloves, sealed at the cuff into the sides of the box, so he can manipulate the tools with his hands in the gloves. Ventilation of the glove box maintains suitable temperatures and chemical concentrations. When special atmospheres are required, the ventilation media may be nitrogen, hydrogen, or more unusual gases, as desired.

Problems associated with air-borne contamination resulting from radioactive or toxic dusts are solved by using conventional dust-removal procedures. For some materials, single filtering is not acceptable from a health hazard standpoint. For these, combinations of

bag-type collectors, air washers, or double or triple filtration by successively more efficient filtering media are used.

Personnel wearing protective clothing replace the filters from the dirty side and package them in plastic containers for disposal. Positive means are provided to prevent the dust from being borne to the clean side of the filter bank. Filter holding frames are sometimes pressurized to prevent any dirt-laden air from bypassing the filters.

• **Air control in "hot" plants**—Room-to-room spread of air-borne contaminants is controlled by maintaining lower pressures in rooms where the contaminants originate. This is done by providing excess exhaust air flows in the originating rooms and excess supply of air to the adjoining spaces, thus assuring that air will flow toward the source of contamination.

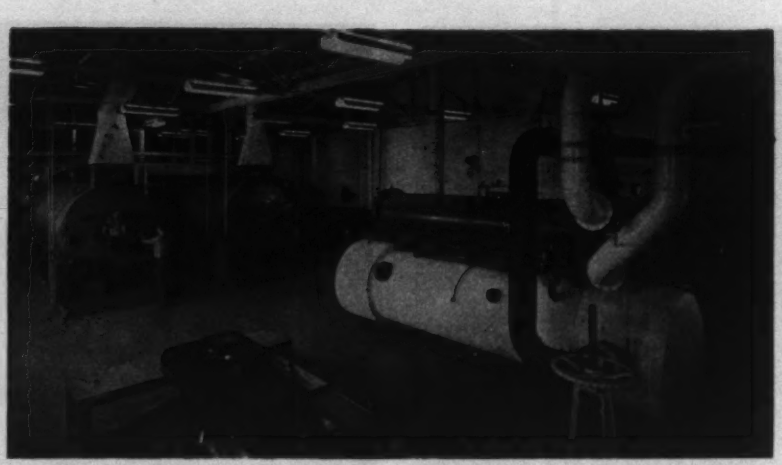
In some instances, static pressure control of the air quantities supplements the original design, while differential-pressure alarms signal evacuation warnings if pressure differentials are not maintained.

In general, ventilation and air conditioning of "hot" facilities is on a once-through basis; i.e., there is no return of air from hazardous or semi-hazardous areas back through the supply equipment for recirculation. Also, use of chemical hoods and glove boxes to control fumes requires that large air quantities be handled. The result is that greater capacity is needed for the heating for such facilities than for ordinary industrial buildings.

• **Designing for computer**—Increase in use of electronic computers by a wide variety of industries for billing, inventory control, design, bookkeeping, and other purposes, has required some revision in building design, because of the weight and high heat release of the equipment.

In many applications, the electronic equipment room is built with a raised floor to provide space below for the cables and air to the computers. Cooled, filtered air is introduced in the plenum below the floor, passing upward through openings into the equipment to be cooled. The floor is generally arranged on a modular basis for flexibility in making changes in the equipment or adding future components.

There appears to be a trend in the electronic computer field to transistorized equipment, which requires lower electrical input and reduces the air-conditioning and structural requirements. Developments in semiconductor research point toward further load reductions in this field.



MORE MECHANICAL EQUIPMENT is required for new plants. Shown are a 500-ton refrigeration machine, two 250-bhp hot-water generators in a semiconductor plant.

• **Effect of automation**—When applied to existing plants, automation is usually accomplished within the structure of the building. But when a new plant is designed for the specific installation of a particular system of automation, an entirely different building concept is indicated.

An automated production line, for example, is the heart of a new facility at L'Anse, Mich., for manufacturing wood-fiber building board. Production buildings were designed around the production line, rather than the production line to accommodate an existing building or to fit a particular configuration.

Workers in this plant monitor the automatic equipment and its controls. They do not handle the product at any stage from the entry of logs into the cleaning station until the finished board product is discharged from the stackers.

The vast production potential of plants of this type necessitates that raw-material and finished-product storage areas be proportionately larger than those required for similar storage in less automatic factories. The facilities for handling process effluents have likewise become relatively larger.

In contrast, employee facilities, such as washrooms, cafeterias and parking lots have become proportionally smaller, since less manpower is required to achieve equivalent output. In factories being converted to automated production, it is frequently necessary to reallocate space from production and employee services areas to raw material and finished-goods areas, because of the greater productive capacity of the automated equipment per unit area.

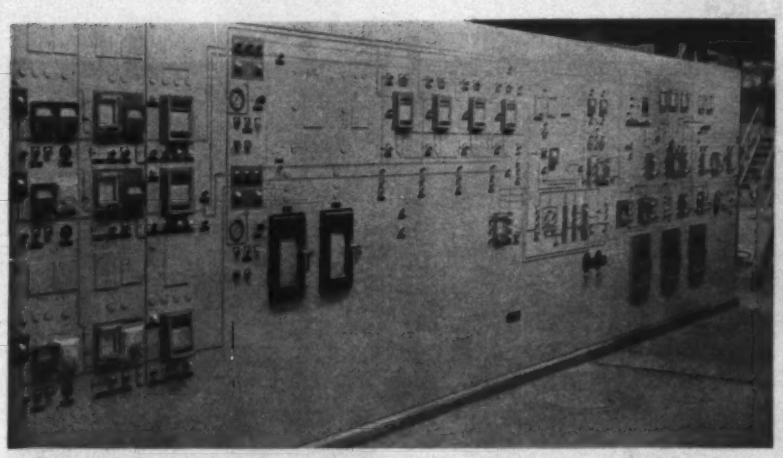
• **Automation manufacturing**—Automation equipment is not normally conceived and developed where it will be used, but rather is designed and built in a plant operated by specialists in this field. Such plants must have facilities for building, assembling, testing, dismantling and shipping the automated production line. Single equipment assemblies hundreds of feet in length must be built up on the floor of the designer's shop.

Plant design for the automation-equipment manufacturer must anticipate problems of handling heavy equipment, alignment, possible requirements for coolant handling, flexibility of assembly area, adequate design areas, and employee facilities oriented toward highly skilled mechanics and engineers. Consideration must also be given to expansion of these plants as use of their products (automated equipment) increases.

One such plant in the Detroit area has been provided with a high-temperature hot-water system, in consideration of its future size. The office and engineering areas are air conditioned, and the design of the rest of the plant contemplates future air conditioning.

High-temperature hot-water heating systems were first used in Europe, and have gained favor in the U. S. only in the past decade. The major impetus to this movement was given by studies of heating systems by the Air Force and Corps of Engineers for air bases. These studies established the economy of central-station high-temperature water systems where distribution lines are extensive.

• **Multipurpose floor systems**—Increased use of telephones, dictating machines, electric typewriters and the like, has created a substantial demand for underfloor electrical ductwork in general office spaces. The ability to run additional circuits and to provide outlets wherever required is highly desirable. A number of fabricators make components for floor



CONTROL CONSOLE for an automated production line is an example of a new type of equipment being installed in the latest industrial buildings.

systems that incorporate electrical raceways in the structural floor, enabling the designer to provide thinner floors and consequently lower floor-to-floor heights.

Some floor systems include ventilating ductwork with appropriate air discharge devices. They permit even lower floor-to-floor heights by eliminating the need for space above ceilings for branch air ducts.

• **Windows—yes or no?** — The recent widespread acceptance of air conditioning has had significant influence on building design. The old mill-type factory building with continuous windows and skylights is rapidly being supplanted or replaced by windowless air-conditioned buildings. But for plant office buildings the present trend is to the "all-glass" wall.

The trend in office building design probably will swing back somewhat from the present extreme glass areas, which introduce a high solar heat load. More generous use will be made of shading devices.

• **Lighting levels rise**—With greater demand for air conditioning has grown a corollary demand for improved lighting —the other major environmental factor in occupant comfort and efficiency. Where formerly illumination levels of 30 to 70-ft-c were considered generous, present illumination levels in excess of 100-ft-c are becoming more commonplace. This better lighting has resulted in part from the higher efficiencies of fluorescent lighting, improved ballasts, and 277 and 480-v circuiting, and in part from the fact that the higher electrical heat gain (due to the increased number of fixtures) can be taken care of by the air-conditioning system.

Accompanying the higher illumination values have been developments in luminous ceilings, eggcrate ceilings and combination lighting-air-conditioning troffers. These have greatly altered the working media around which attractive building interiors have been designed.

• **Advance in noise control**—Acoustic treatment has recently become far more effective in its handling of noise (and vibration). Comparatively recent developments in this field are acoustic ceiling tile that can be readily cleaned, vinyl wall coverings offering similar advantages, acoustic tile incorporating means for the introduction of heating or cooling, bellows-type vibration isolators for piping, and spring and rubber-in-shear vibration mountings for equipment.

Sound ratings have been published for many items of mechanical equipment, particularly in the air-handling field, although even in this limited field, the list is far from complete. We expect more and more equipment soon will be rated for noise levels. This will be forced upon manufacturers by the demand for such data as a prerequisite to acceptance of equipment by architects and engineers.

• **What's ahead**—Most of the changes in building concepts discussed have their origins at least five years ago. It is to be expected that some of the more recent developments, such as solar heating, plasma heating, heat pumps, Peltier-effect cooling, space frames and double-curved structural systems, and synthetic products of all sorts will effect considerable change in building design as their economies are demonstrated. The nature of these changes cannot be predicted in detail. There is no doubt, however, that future plants will be more efficient in operation and maintenance.

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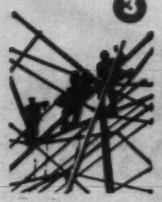
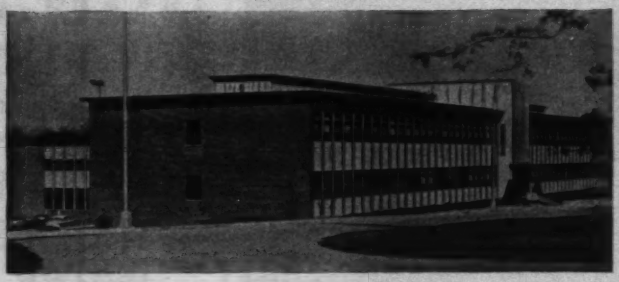
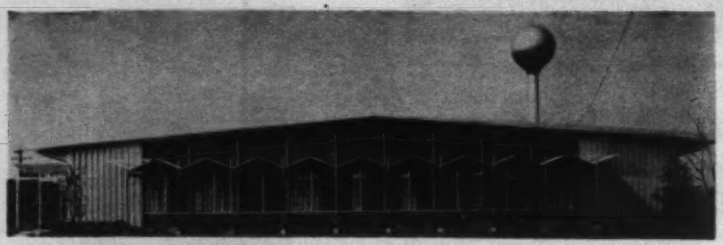
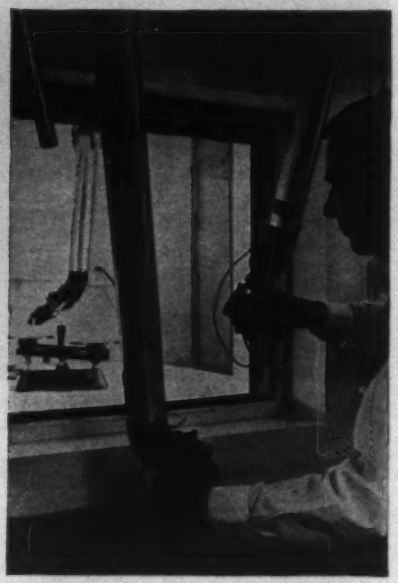




NEW STEELS feature an addition to U. S. Steel's Research Center.



PLASTIC AND ALUMINUM enclose Owen-Corning's 100-ft-span laboratories.



HOT CELL is key area in Marquardt's lab.

Industry's Research Buildings

Some of the most unusual facilities ever constructed are going into current industrial research buildings. They include rooms in which any kind of climate may be duplicated; rooms in which fixed conditions must be maintained at all times; and rooms completely insulated from surroundings because they contain radioactive materials or are used for acoustic experiments. And there are laboratories from which even the minutest speck of dust must be excluded.

As a matter of fact, there are no fixed rules for deciding what goes into a research building. Every structure must be custom designed to meet the specific needs of the researchers. However, there are certain planning principles that should be observed to insure efficient operation and expansion (see p. 58).

Industry spent $9 billion for research and development last year, $9.6 billion this year. It expects to spend nearly $11 billion in 1963. To house the research and development effort, manufacturers spent about $680 million for research facilities this year. The output—usually new products—will stimulate construction of many new industrial buildings in years to come.

Here are some examples of the facilities industry has been building for research and development in its current program.

• **Column-free interiors**—Four of five new buildings erected at the Owens-Corning Fiberglas Corp. Technical Center near Granville, Ohio, have no columns in the interior, though they are 100 ft wide. They are spanned by structural steel rigid frames.

The long clear span permits complete flexibility in subdividing the interiors. Laboratories and offices are formed with movable partitions.

The five new buildings join the existing five-building Pioneering Laboratories on a 154-acre site. They are a 100x300-ft chemistry and physics research facility, 100x300-ft glass and mechanical research structure, a 100x180-ft product testing building, a 100x200-ft reinforced plastics development plant and a 62x98-ft sound laboratory. The layout is campus type.

Extensive use is made on the exteriors of glass-fiber reinforced plastic panels that transmit light. The remainder of the exterior walls is glass and aluminum panels with glass-fiber insulation. Roofs have similar insulation and are topped with glass-fiber builtup roofing.

Design was based on 10-ft modules—that is, complete facilities—heating, air conditioning, lighting, services—are available at 10-ft intervals.

The air-conditioning ducts are made of glass-fiber boards. Glass fiber products also are used in the acoustical ceiling, for vibration absorption under machinery and for polarizing light panels in flush fluorescent fixtures.

The sound laboratory is designed for flexibility in researching, testing and measuring acoustical properties of glass-fiber products. The reverberation room, a 10,000-cu-ft chamber on an isolated foundation, will be used to measure acoustical properties of materials and noise from equipment. It is dominated by an 8x16-ft vane that hangs from the ceiling and revolves at 10 rpm, to break up sound waves.

Three architect-engineer firms designed the buildings—Samborn Steketee & Associates, Otis & Evans of Toledo; Giffels & Rossetti of Detroit; and Voorhees Walker Smith Smith & Haines of New York City. Ferro Concrete Construction Co., Cincinnati, a subsidiary of Turner Construction Co., was the general contractor.

• **Building of special steels**—Recent developments of United States Steel's Research Center at Monroeville, Pa., are featured in the center's newest addition, the Electromechanical Building.

ROOFTOP FILTER removes "hot" particles for Atomics Int'l Lab. **FACILITY** quiets jet engines for North American Aviation.

Provide Strange Environments

Included are vinyl-coated steel, stainless steels and enameled steel, and a new-type steel window.

The new building is T-shaped in plan, mostly two stories high. It provides 53,300 sq ft of floor area for research in the fields of instrumentation, mechanisms, and automatic and quality controls. The researchers will also provide general engineering, mathematical and scientific computing services for other groups at the center.

Vinyl-coated steel is used in the interior of the building to demonstrate the decorative properties of this new material. The steel was coated in the production process with liquid vinyl and embossed to achieve a textured leather-grain finish. It forms the interior surface of curtain-wall exterior panels, floor-to-sill enclosure of convection heating and air-conditioning units, and interior walls and acoustical ceiling of the principal conference room.

The new windows have a roll-formed stainless steel frame, the steel being factory preshaped before being fabricated into the frame. The process was developed to provide window manufacturers with a corrosion-resistant, attractive, sturdy material that affords easy and low-cost fabrication.

The windows are divided into three horizontal sections. The top panel is stationary. The middle and lower panels are projecting type, opening in opposite directions.

The windows form continuous bands at each level of the two-story sections of the building. Sandwich wall panels above and below them are faced with blue or gray porcelain-enameled steel. A glass-fiber insulation core separates this facing from the vinyl-coated steel interior facing. The wall panels and windows are attached between stainless steel mullions extending from foundation to roof.

Structural framing consists of steel columns and open-web joists. Floors, designed for 125-psf live load, are concrete, covered with vinyl tile. The roof consists of a steel roof deck, insulation board and builtup roofing.

Corridor walls are plaster and glazed tile, but partitions between offices and laboratories are movable. Design was based on a 10-ft module.

Lighting is fluorescent. Fixtures are surface mounted, have steel louvers and luminous sides, and contain two 96-in. 75-w instant-start lamps. Metal-pan acoustic ceilings are used in most areas.

Outside the 17 laboratories in the structure are 14 safety islands. Each consists of an overhead shower, eye-wash fountain, fire hose and chemical extinguisher, oxygen mask and fire blanket. The islands are identified by red lights.

Architects-engineers were Stotz and Stotz of Pittsburgh. George A. Fuller Co., New York City, was the general contractor.

• **Two different types for Du Pont**—E. I. du Pont de Nemours & Co. is constructing two 40,000-sq ft laboratory buildings near Wilmington, Del. Each will cost about $2.2 million. They will have the same height—mostly two stories. And in each, extensive use will be made of Du Pont products. But there the similarity ends.

One building is intended for physical research, the other for sales service—to help customers use Du Pont products in their own manufacturing facilities and to solve problems that may be encountered in applications of these products.

The greatest need in the physical research laboratory is for flexibility, whereas in the sales service facility, flexibility is needed only in the demonstration area. In the research building, electrical service must be more varied and requirements are more rigid; floor loading is heavier; air conditioning is more for process purposes than for comfort. In contrast, appearance is more important and air conditioning is for com-

fort in the sales service building, because it will be visited frequently by customers.

The physical research laboratory is a double-corridor design based on a 6-ft module. Offices are located along the exterior walls. In the interior are two rows of laboratories, backed against a central service corridor.

In this corridor is an exhaust system that removes heat and fumes from the labs.

Heaviest equipment will be placed in the basement. Other floors and the roof, which may become a third floor in the future, are designed for a 150-psf live load.

Electrical service to the laboratories will be closely controlled as to voltage and wave form at a substation.

A secondary supply for other power requirements will be brought in separately.

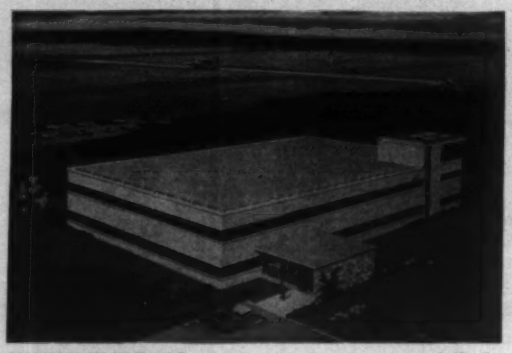
A plug-in bus duct will bring instrument power to the laboratory benches. This service will be 120/208-v, three phase; 110-v ac also will be wired separately to the benches. Laboratory furnaces will be supplied electrical power separately, because of the wave-form distortions caused by the heavy current thermostat switches in the furnaces. And a duct will be installed around the periphery of the laboratories for easily changeable instrument intercommunication.

Air conditioning generally will maintain a temperature of about 75 F and a relative humidity of 50% or less. Incoming air will be passed through foamed-urethane filters, through preheaters and over a ten-row cooling coil, to remove moisture. Ducted to the zone-controlled offices, air will be distributed in the rooms through diffusers.

The air will be vented into a plenum above the ceiling. There it will be drawn to a fan coil unit and discharged to a laboratory, which has its own thermostatic controls. The fan coil units are located in the corridors between offices and labs and may be placed, as needed, in any 6-ft module. The air will be exhausted from the labs through the exhaust system in the service corridor.

The key element of the sales service building is the demonstration area, 65 x 80 ft by 23 ft high. Flexibility is needed because here full-scale equipment will be set up to demonstrate to customers how the company's products can be used.

The need will be met by installation of four strips containing necessary services.



SINGLE BUILDING is economical, expansion, difficult.

ARTICULATED FACILITY offers easy expansion, good circulation.

Planning Research Facilities

By Frank L. Whitney

Laboratory design should begin with a master plan that anticipates the ultimate research program. Such a plan should insure coordination of building arrangements and allow for orderly expansion, avoiding expensive future changes.

Shape and dimensions of a research complex depend greatly on the form that expansion may take. For a highly diversified company, for example, projects may have to be carried out in separate structures. A more specialized company may handle research as a tight-knit operation under one roof.

Mr. Whitney is vice president of Walter Kidde Constructors, Inc. His analysis of the principles involved in planning research facilities for industry is based on his experience with many laboratories designed and built by his organization and others.

Four distinct building areas are necessary:

1. Laboratory—experimental areas, offices and conference rooms for researchers, mechanical services and storage.

2. Administrative offices—executive, staff, clerical.

3. Amenities—library, auditorium, cafeteria.

4. Services—boiler plant, refrigerating equipment, cooling tower; waste disposal; substation, water supply and storage; warehouse; machine shop, glass blowing; pilot plant and outside experimental area; parking lots and roads.

The site chosen should be at least four times the area of the ultimate complex. However, much more land is desirable for esthetic reasons, insulation from surroundings and greater freedom in arranging buildings. Zoning requirements, in some cases, make a high land-to-building area necessary—sometimes, 20:1.

The master plan should provide for independent expansion of all components—laboratories, administrative offices, amenities and services. And the expansion should be accomplished without much of a reduction in insulation from the surroundings.

Building arrangements should be governed by ease of personnel circulation. Thus, the laboratories should be at the hub of the complex, with easy access to all services.

However, some isolation is essential to maintain security and prevent excessive traffic from disturbing researchers. One device for this purpose is to separate cafeteria, meeting rooms and auditorium from the labs, yet provide entrances to those facilities from the main lobby. Also, administrative and reception areas can be interposed between the labs and the main entrance.

Staff services, including centralized lab facilities, such as computer and distillation rooms, should be located near administrative areas, to provide easy access

The building also contains two-man laboratories, each 18 x 25 ft, with equipment similar to that used in most chemical laboratories.

• **Building for expansion**—Although an eight-story physics building is still under construction for Eastman Kodak Co. at Rochester, N. Y., the initial stage of a future addition has already been completed. This is a basement on an adjoining 100 x 107-ft site.

Footings and columns have been placed to support floors matching those in the physics building.

The basement has been roofed and will be used for storage. The roof will be blacktopped to provide parking.

The physics building itself contains several unusual features—a 160-ft lens tunnel, an optical penthouse, basement X-ray rooms and a series of electrical grounds.

The $1.5-million building is rectangular in plan, the upper portion being slightly larger than the 104 x 210-ft ground dimensions. It will provide 205,000 sq ft of floor area. Of steel-frame construction, it will have an exterior of porcelain-enameled steel panels, brick and glass; interior partitions will be movable steel units.

At basement level will be a 160-ft-long tunnel for research on lenses and optical systems. The tunnel is thermally insulated with 3 ft of compacted earth cover.

Since vibrations are objectionable in optical experiments, machinery in the building will be kept small. There are 16 fan rooms, each employing a relatively small, vibration-free motor.

A penthouse will permit studies of such subjects as long-distance photography and the physical characteristics of sunlight. A railed, tiled area for outdoor experiments also will be located on the roof.

Basement rooms with 24-in.-thick concrete walls will allow use of very high voltage X-rays. Utilities to these rooms will come in underground, to eliminate danger to personnel from radiation leaks at entry points.

A series of electrical grounds were installed for electronics studies. They consist of 3-in. copper pipes anchored to bedrock and connected to the labs with low-resistance cable. The pipes may be filled with water to improve the ground connection.

Offices are located around the perimeter of the building, labs in the building's interior.

Each group of labs are served by a vertical shaft extending the height of the structure. Services provided include 35 F chilled water, steam at 70 psi, compressed air, distilled water. Offices and labs are air conditioned.

Ridge Construction Co., a Kodak subsidiary, is the general contractor on the job.

• **"Hot" laboratory**—The Marquardt Corp. has built a $200,000, 53 x 35-ft, one-story laboratory building, with storage and loading areas, principally for studying radiation effects. It will be used for Project PLUTO, a nuclear ramjet development program.

Located in a three-acre enclosure at Marquardt's Van Nuys, Calif., plant, the laboratory has been designed to accommodate and store up to 100 curies of radioactivity and handle up to 10 curies at any given time, in accordance with Atomic Energy Commission licensing standards.

A hot cell is the heart of the laboratory. The 6 x 4.5-ft area is enclosed with 18-in.-thick, high-density concrete walls and a 6-in.-thick leaded-glass window. Radioactive materials in the cell will be handled by remotely controlled manipulators.

A low-level radioactivity area is adjacent to the hot cell. Operating personnel there will handle irradiated material in a glove box.

Laundry facilities and shower rooms are provided to prevent personnel from carrying out radioactive particles. Radiation levels will be checked with a hand-and-foot counter. Strong detergents and sequestering agents will be used in the washing machines, which will be operated on separate cycles for hot, slightly contaminated and uncontaminated clothing.

Exhaust air from the air-conditioning system will be filtered before discharge to the atmosphere. A filter developed by the Army Chemical Corps will be used for the purpose.

Two 4,000-gal tanks outside the building will be used for storing waste.

(Turn the page)

CAMPUS COMPLEX gives maximum isolation but has poor circulation.

for Industry

and good circulation. Divorcing service areas from the labs has the same advantage of reducing disturbance as separation from normal plant operations, such as loading and unloading, maintenance and warehousing.

Layout of structures in a research complex falls into three classifications—single building, articulated building, campus plan.

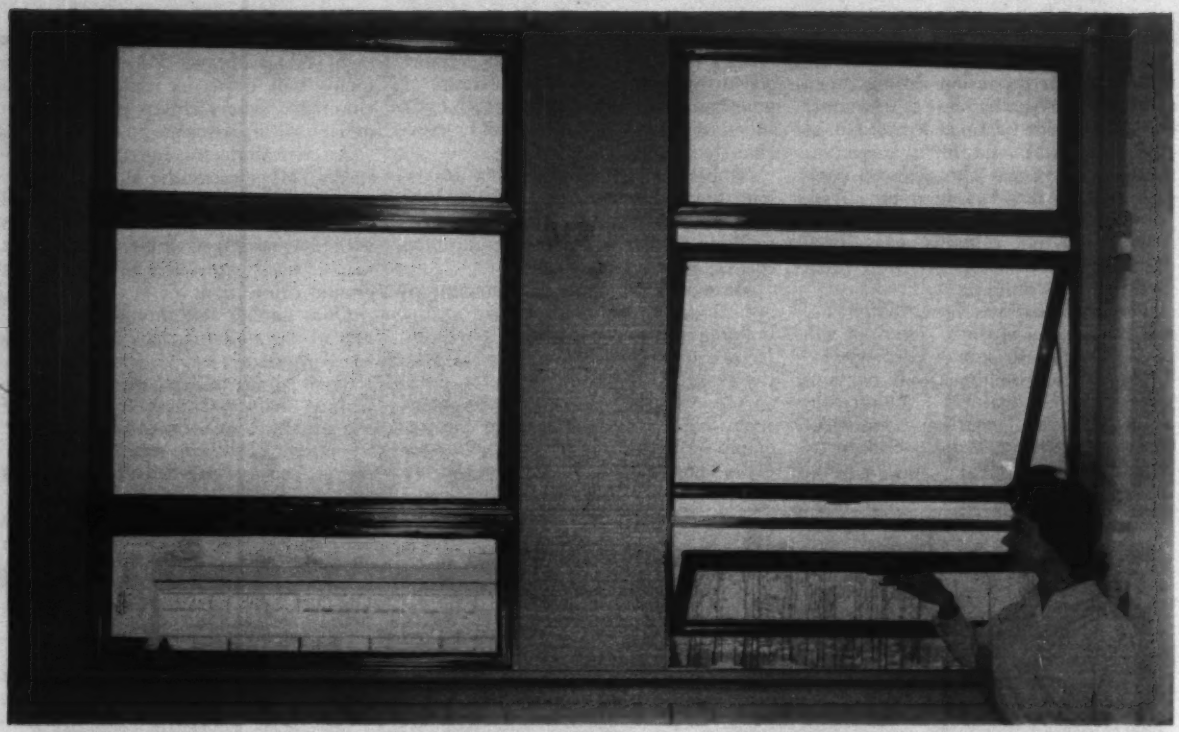
These have the following advantages and disadvantages:

Single building—most economical, best circulation and communication, least flexibility for expansion, minimum isolation of labs. It is best suited for a restricted research program with limited growth potential. (A second floor should be added to a single-story building when the floor area reaches 50,000 sq ft or the cost of mechanical and electrical services come to about half the total cost of the structure.)

Articulated facility—maximum separation of functional areas, excellent growth potential, site and services are expensive, intercommunication is not as good as in a single building.

Campus plan—complete separation of buildings, maximum flexibility of expansion, long service lines, poorest circulation and communication, most expensive. It is best suited for a highly diversified program, where maximum isolation of projects is desired, or where there is danger of explosion or contamination.

To check the efficiency of a plan, compute the ratio of assignable area to the total floor area of all buildings. Assignable area is that portion of the structure in which people work; it does not include service areas, such as corridors, washrooms, stairs, storage, lobby, cafeteria and auditorium. If the ratio is considerably under one-half, the layout is inefficient; if the ratio exceeds 0.6, there probably is inadequate provision for services and corridors and inadequate amenities.



NEW STEEL WINDOW was installed in the Electromechanical Building at U. S. Steel's Research Center. It has a stainless steel roll-formed frame, two movable panes. The window was developed for ease and economy of fabrication.

Samples will be checked for radioactivity before release to the sewage disposal system. If the waste is hot, it will be transferred to barrels for burial at sea.

The building has concrete-block exterior walls and wood roof beams. It is windowless. Floors are concrete, covered with asbestos-vinyl tile. Ceilings are acoustic tile. Lighting is 120-v, three-tube fluorescent, providing from 200 to 1,000 ft-c.

Marquardt's engineers designed the structure. Permanent Construction Co. was the general contractor.

• **Nuclear research lab**—Two of four major buildings built for Atomics International Division of North American Aviation will be for research on nuclear materials. Before they could be built, the problem of getting ridding of "hot" gases had to be solved. The solution was rooftop filters rated at 99.95% efficiency.

The buildings are part of the $5-million DeSoto Facility in Canoga Park, Calif. They are for engineering and administration (with rooftop heliport); employee services; manufacturing and development; and laboratories.

The manufacturing and development building is a 138,000-sq-ft, steel-framed, high-bay structure devoted to work on fuels, fabrication and assembly. The laboratory building is two stories high, of concrete construction and provides 106,000 sq ft of floor area. The first floor contains solid-state physics and chemistry laboratories, research and development areas, and a library. The second floor is divided into 20 x 24-ft laboratories for physical and chemical research, including a hot lab. Both buildings contain an exhaust system for hot wastes.

Hot areas of the second-floor laboratories are equipped with fume hoods and glove boxes. Ducts connect these with the main exhaust system. Air pressure in the labs is kept below that of the corridors, so that air flow is always directed into the labs to preclude escape of toxic gases.

In larger areas, a general exhaust system that works on the same principles is used. Exhaust air is vented to ducts leading to the main exhaust system. Air is replenished by the air-conditioning system.

The exhaust is fed to seven filters on the roof of the laboratory building and five on the manufacturing and development building.

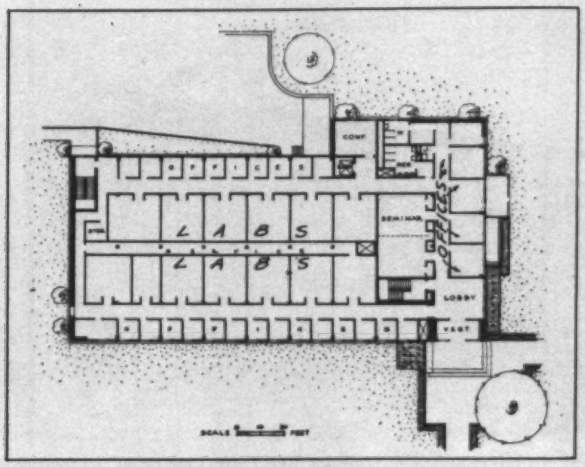
Each filter unit is equipped with a 20,000-cfm fan, which provides the needed suction.

K. A. Neptune was the architect-engineer for the manufacturing and development building and Lindgren & Swinerton, the general contractor. Albert C. Martin was the architect-engineer for the other three buildings, and C. L. Peck Construction Co., the general contractor.

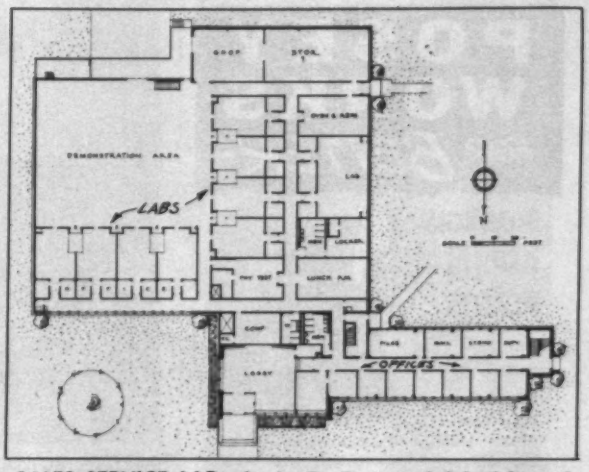
• **Climate duplication**—The Environmental Test Laboratory built for the Aeronutronic Division of Ford Motor Co. has a vast array of test devices and chambers to simulate a variety of natural or artificially created forces. These forces are applied in tests of Aeronutronic's products.

The building is one of five major structures completed for a $22-million Engineering and Research Center on a 200-acre site in Newport Beach, Calif. They will be used for studies of weapon and space systems, missile range systems and instrumentation, electronics, data processing and computers.

The environmental test facility is a one-story structure with 20,000 sq ft of floor area. It has a structural steel frame and metal deck roof. Exterior walls consist of 5-ft-high precast con-



PHYSICAL RESEARCH LAB for Du Pont required flexibility in space arrangement and services within easy reach.



SALES SERVICE LAB, also for Du Pont, needed flexibility only for demonstration area. Esthetics, comfort were important.

crete walls, above which metal siding extends to the roof, 26 ft above the floor.

The laboratory can study the effects of sun, rain, altitude, vibration, shock, acceleration and radio interference. It is investigating environments to be encountered in outer space.

The temperature, humidity and rain chamber is a major facility. The working area is 8 x 12 ft by 8 ft high. It can create temperatures from 0 F to 200 F, programmed humidity and a variety of rain conditions. The ceiling contains thousands of glass nozzles—similar to medicine droppers—that produce up to 4 in. of "rain" an hour. Direction of the rain can be varied from the vertical to 45 deg.

A radio screen room permits work in both atmospherics and dynamics. It provides a space free of radiofrequencies from 10 kilocycles to 10,000 megacycles.

The room is used for testing radiation devices that might interfere with operation of other electronic equipment. The room is shielded with ¾-in. plywood having 24-ga galvanized steel bonded to both faces. Power lines are filtered to eliminate unwanted frequencies.

A concrete and bulletproof-glass safety enclosure houses a shock test machine that simulates acceleration and inflight shock conditions of surface-to-surface missiles.

The equipment consists of two 10-ft-long metal cylinders bolted one behind the other, an internal block—a 10-ft cube of reinforced concrete, a carriage for the component under test and 52 ft 6 in. of horizontal track along the walls of a concrete trench.

Air, compressed to 3,000 psi in the rear cylinder, is released against a piston in the forward cylinder. The piston, which has a stroke of about 55 in., propels the carriage down the track with a thrust up to 500 kips. Acceleration of the carriage ranges up to 2,000 times that of gravity.

Foamed-polystyrene panels with a total thickness of 6 ft are placed at the end of the track to stop the carriage in case of braking failure.

Pereira & Luckman of Los Angeles were the architects-engineers. Vinnel Construction Co., Alhambra, Calif., was the general contractor.

• **Computer laboratory**—Rigid control of temperature and humidity and virtually shadowless, glare-free lighting are required in the $4-million Computer Systems Laboratory designed and built for Litton Systems, Inc., in Woodland Hills, Calif.

The one-story, 180,000-sq ft, steel-framed structure is largely devoted to development and production of compact, high-speed computers for navigation and fire control of aircraft and missiles. A portion of the building is used for production of inertial guidance systems.

A double-plenum system is used for the closely controlled air conditioning. The lower plenum, which contains refrigerated air, is divided into 33 zones, each served by a 25-ton-capacity heat pump.

Cool air is delivered to offices through small vents in the ceiling tile, to shop areas through T-bars. The air never travels more than 60 ft.

A return-air plenum is superimposed on the supply-air plenum. The air is recirculated to the heat pumps, augmented with 10% fresh air. Air-conditioning equipment is located on the roof.

A separate 20-ton heat pump is provided for the large computer equipment It is supplied through a plenum under the equipment floor.

In areas where lighting is critical, both general and local-lighting is used. Fluorescent lamps are run in perpendicular rows, with the general lighting at ceiling level and local lighting below, shielded by diffusers.

Albert C. Martin & Associates and Budlong & Associates were architects-engineers. C. L. Peck Construction Co. was the general contractor.

• **Unusual construction**—A 400 x 275-ft, two-story research building erected for Philco Corp. in Blue Bell, Montgomery County, Pa., will have unusual walls and roofs.

Exterior walls are made of ceramic tile set in aluminum frames. Hyperbolic-paraboloids of thin-shell concrete roof the employee cafeteria. And an undulating thin concrete shell vaults over the 8,000-volume library.

The building will be used for research in space communication, microwave devices and systems, solid-state electronics and electrovisual devices.

The air-conditioned building is of waffle-slab reinforced concrete construction. Plastic pans served as forms; they were removed with compressed air after the concrete had gained sufficient strength.

The Ballinger Co. was the architect-engineer, Irwin & Leighton, the general contractor—both are in Philadelphia.

• **Appearance emphasized**—Because it will be readily visible to travelers on the northeast extension of the Pennsylvania Turnpike, a new engineering center was given a striking exterior. The building, covering 6.4 acres of a 100-acre site in Montgomery County, Pa., is being con-

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PHYSICS BUILDING for Eastman Kodak houses a 160-ft lens tunnel, optical penthouse and X-ray rooms. Paved lot covers basement of a future addition.

structed for the Remington Rand Univac Division of the Sperry Rand Corp.

The center consists of a 240,000-sq-ft, one-story research building and a two-story office building connected by a large glass-enclosed lobby.

The front (south) and west walls of the office building will be shielded from the sun by 30-ft-high louvers, automatically controlled to keep the facade in shade. The louvers are 30 in. wide and made of aluminum with a baked-enamel finish. Behind the louvers is an insulated porcelain-enameled metal panel wall set in aluminum frames.

The 420-ft-long front wall of the research building is windowless and built with buff colored brick. On it is mounted the name "UNIVAC" in letters each 6 ft high and up to 10 ft long. The remaining exterior walls are aluminum insulated siding.

Water storage of 500,000 gal will be hidden in a concrete vault under one corner of the building.

The Ballinger Co. is the architect engineer, Wark & Co., the general contractor—both firms of Philadelphia.

• **Underfloor services** — Flexibility is achieved in the new $2.25-million Boeing Scientific Research Laboratories at Seattle by placing services in an easily accessible tunnel.

The one-story, steel-framed building contains 65,000 sq ft of floor area. It will be used for research in gas dynamics propulsion, flight mechanics, plasma physics, geoastrophysics, mathematics and solid state physics.

The building has a double-corridor plan, with 58 offices on the two 450-ft sides. Between the two corridors are two rows of laboratories, separated by movable steel partitions.

The laboratories are served by a central underfloor utility tunnel. Access to the services is provided at regular intervals on both sides of the partition, to provide flexibility in meeting ever-changing needs.

Emphasis has been placed in the design on providing a quiet, comfortable environment. Sound-deadening construction and quiet air conditioning in laboratories and key offices is supplemented by a "call director" system for controlling incoming telephone calls. When the researchers do not want to be disturbed, they can divert the ring to nearby secretaries.

Boeing's laboratory staff cooperated with Austin Associates and Walter Dorwin Teague Associates on the design. The Austin Co. was the general contractor.

• **For quieting jets** — The $155,000 Sound Abatement Building constructed for North American Aviation, Inc., at Columbus, Ohio, is designed to reduce the noise level of jet-engine runups by more than 90%.

Constructed of reinforced concrete, the 76 x 36-ft structure has walls 12 to 18 in. thick. Portions of the interior walls are lined with sound-absorbing material.

At the front of the building are a pair of 25-ft-square, 8-in.-thick sliding doors, shaped to fit snugly around a plane's fuselage. Each door weighs 12 tons. Electrically driven, they are edged with sponge rubber to prevent damage and they are braked automatically if an object contacted is depressed 0.25 in.

In an engine test, the jets are lined up with two large tubes that direct the

(*Continued on p. 67*)

Plane, Train or Limousine?

(*none of these, this is a helicopter!*)

Looks like a conference room, doesn't it? Well, it is in a way. The cabin of this new turbine-powered Sikorsky S-62 was designed by Raymond Loewy to make every trip conducive to meetings, study, work and even rest.

The turbine engine not only contributes to this atmosphere with its smooth, quiet operation but also has an unequalled record of reliability to recommend it. And because the mechanical components of the S-62 have been proven in over 1,000,000 hours of flight, periods between overhauls are four to five times longer than would normally be expected of new components.

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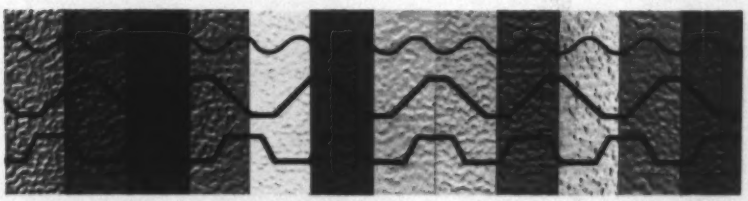
Building site, courtesy J. M. Straus Co., General Contractor, Newark, N. J.

. . . and holds the line on costs



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Beers Steel Bldg. Corp.
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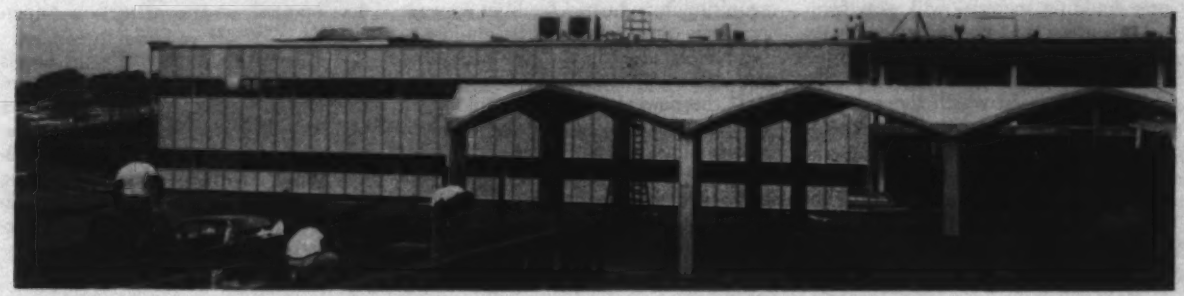
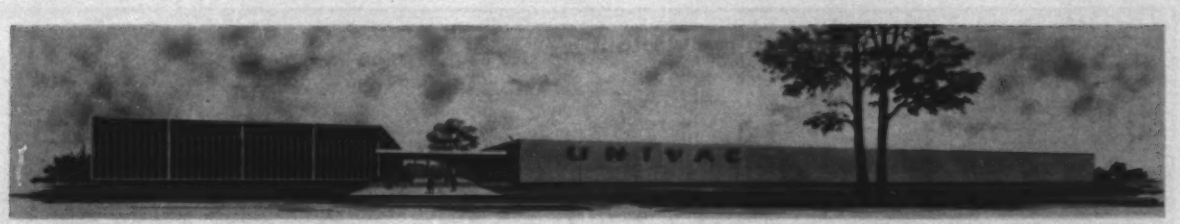


WALLS of Philco's lab are faced with ceramic tile. Hyperbolic-paraboloids roof the cafeteria.



LOUVERS automatically controlled shield Univac lab windows from the sun; long walls are brick and windowless.

noise to the sound absorbing material and also diffuse the exhaust. The tests are controlled from a nearby building.

McConathy, Hoffman and Associates, Inc., of New York City, were design consultants. Sheaf Construction Co., Columbus, was the general contractor and Koppers Co., Baltimore, installed the acoustical treatment.

• **Controlled conditions**—A $3-million research center built for Haloid Xerox, Inc., at Rochester, N. Y., contains areas in which constant temperature and humidity control is established for studies of semiconductors. It also has laboratories equipped with pressurized air locks for investigation of high- vacuum evaporation techniques.

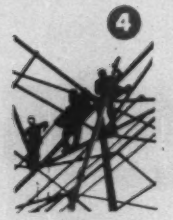
The Haloid Xerox Research Laboratory consists of three units for research, engineering and administration, joined together by covered passageways, and a small, separate building for service and maintenance.

Built on a 182-acre site, the structures provide 100,000 sq ft of floor area. They will be used for research in the fields of recording and display by electrostatic techniques.

The research unit houses air-conditioned laboratories and darkrooms. The labs, basically 10 x 26 ft, are supplied with filtered hot and cold water, steam, compressed air, deionized water, gas, exhaust, and 120, 208 and 440-v electric power.

The unit contains two climatic rooms. In one, it is possible to simulate almost any condition from the Sahara Desert to the Aleutian Islands. Filtration units remove air-borne dirt particles down to five microns in size. Exhaust units for powder-cloud work remove 100% of air-borne powder for discharge to the atmosphere.

Voorhees Walker Smith Smith & Haines of New York City were the architects-engineers. A. Friederich & Sons Co., Rochester, was the general contractor.



How Big Corporations Buy

"Purchasing," "real estate," "plant engineering." They go by different titles. But all these corporate staff departments have one thing in common: Together they purchase hundreds of millions of dollars of industrial building construction for the nation's major corporations each year.

The men who head these departments are the influentials of industrial building construction. They determine where corporations like Alcoa, General Motors, and Western Electric will erect new plants. They decide which architect will obtain a steady stream of design work; which contractor will get a whopping contract next year; which new building material will gain favor.

Most often the top men are engineers. Occasionally they are lawyers or former real estate buyers.

The manner in which the major industrial companies buy construction is as varied as the products they manufacture. Some rely totally on the services of an independent architect. Others insist on keeping all activity under the corporate thumb. Materials may be selected by an architect or by a corporation's chief engineer or by the general contractor. It depends on the particular corporation.

Some industrialists extend a friendly hand to all builders and materials salesmen. Others play favorites, and any newcomer seeking business from such companies must first hurdle a corporate obstacle course.

The opportunities that large corporations offer for new construction business are great. The difficulty is learning how to penetrate the corporate maze to get to these opportunities.

• **When a company needs a plant**—How an industrial corporation goes about acquiring its industrial facilities depends primarily on two factors: the product to be manufactured in the new plant; and the internal policies of the organization.

If the new plant is to be tailored to an extremely sensitive product—such as electronic equipment—then the parent corporation is likely to exert tight control over design and construction. Western Electric, the manufacturing arm for AT&T, for example, builds many of its structures to coddle sensitive telephone equipment. Near-perfect environmental conditions are essential to good production. This is one important reason why the company maintains its own building design staff and strictly supervises all field work.

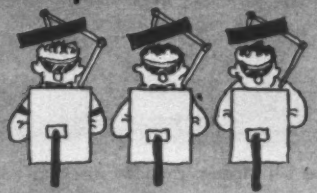
If, on the other hand, the primary requirement of the plant structure is simply to shelter machinery from the outdoors—as in the case of a conventional assembly line plant—than a corporation more readily loosens the reins of construction authority. Boeing Aircraft Co's prime building requirement, for example, is flexibility. Consequently, the company is able to rely heavily on independent consulting firms for plant development and construction supervision.

A corporation's internal structure is equally decisive in determining construction procedures. The automotive industry illustrates how two major corporations who manufacture similar products differ in their plant purchasing procedures. And the effects on architect, engineer and contractor differ accordingly.

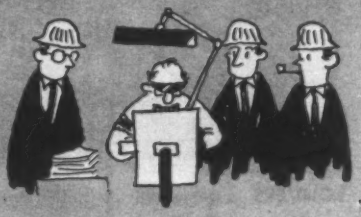
First let's look at General Motors.

When Company A wants a new plant . . .

1. Proposed project comes directly to company engineer's office. Company engineer takes over all responsibility for the project.



2. His design force does all basic design and establishes all specifications.

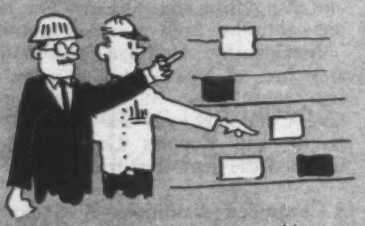


3. Some detail work may be given to independent consultant. And design work that is given out is closely watched.

When Company B wants a new plant . . .

1. They come to the company engineer with specifications.

2. The company engineer gives design and specs out to an independent consultant — who does all plans.



3. Architect and company engineer together select specific materials.

EXAMPLE OF TWO COMPANIES buying construction: Company A who maintains tight control over its building projects; and

Their Industrial Construction

• **GM's design freedom**—Ever hear of the Argonaut Realty Division of General Motors Corp.? Few have, yet it is the instrumentality through which the corporation keeps its fingers on its huge annual expenditure for new plants.

Argonaut is the prime purchaser of construction for all the GM divisions. Argonaut operates as a staff service function, responsible to GM's vice president of manufacturing. It buys all real estate for the corporation, designs new plants, coordinates field construction and performs maintenance tasks. The division maintains a full-time force of about 300 architects and engineers headed by Hugh Arnold.

This staff may seem small for the amount of building that GM does. It is purposely so, explains an Argonaut spokesman. "In the first place, we do no construction ourselves. And we try to maintain a stable employment situation in our department, so when we are busy, extra projects are awarded to independent architectural-engineering firms."

"Furthermore," he explains, "not all GM building construction necessarily goes through Argonaut (although most of it does). Any division of the company has free choice of how it wishes to handle its projects. The division can come to Argonaut for assistance, or it may go directly to outside consulting firms, without working through Argonaut at all."

If a division—say Chevrolet—does decide to work with Argonaut a typical project would proceed this way:

Chevrolet decides it wants a new plant in a certain part of the country; it draws up requirements and requests Argonaut to find specific sites. After the realty division has come up with several possibilities, Chevrolet selects one and gives Argonaut the go-ahead to buy or lease the property.

At this point Argonaut, in agreement with the client, either undertakes coordination of the entire project, or else selects an independent design firm to do the job. The decision is predicated on Argonaut's current work load and the wishes of the client.

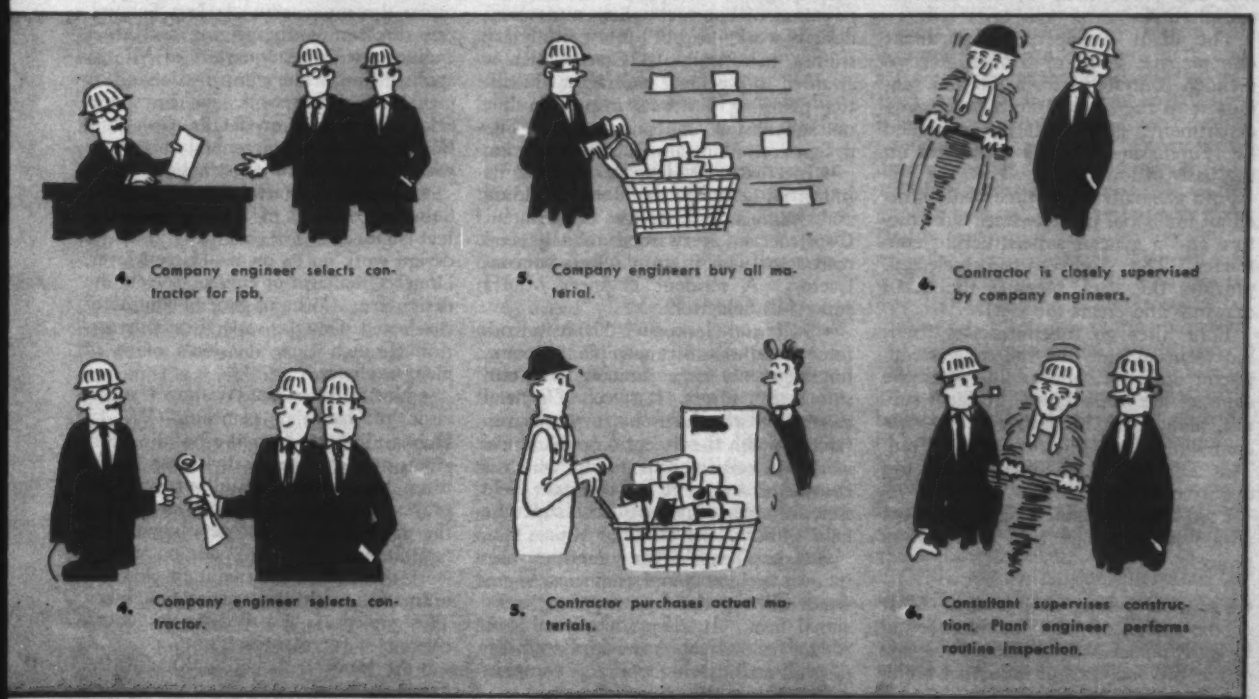
If the project goes to a consulting firm, that firm has a free hand in designing the plant. Argonaut choses a general contractor for the job, but then pretty much drops out of the design picture. The consultant employed must conform to certain GM standards of quality, but other than that he does all original work from general conception to final details of a plant. He also supervises construction.

If, on the other hand, Argonaut handles the project, then its staff does all the architectural-engineering work, and its engineers supervise construction.

To select a general contractor, Argonaut invites several companies to bid on the job; the final choice of contractor is determined on the basis of low bid. For large projects, separate bids are taken for the electrical, mechanical and steel contracts, as well as for a general contractor with responsibility over the rest of the work.

Once the bids are in, Argonaut's regulations allow no renegotiation. If a contractor has miscalculated and his figure is too low, Argonaut gives him only the opportunity to withdraw the bid.

Argonaut believes that its system of placing all design and construction re-


4. Company engineer selects contractor for job.
5. Company engineers buy all material.
6. Contractor is closely supervised by company engineers.
4. Company engineer selects contractor.
5. Contractor purchases actual materials.
6. Consultant supervises construction. Plant engineer performs routine inspection.

Company B who delegates lots more responsibility to the independent consultant.

sponsibility with the architect-engineer—be it Argonaut or a consultant—avoids confusion and duplication of effort.

• **Ford's tight organization**—Now let's take a look at another automotive manufacturer—Ford Motor Co. Unlike its bigger competitor, Ford exerts much tighter control over the development of its industrial projects.

When a Ford division receives executive approval to build a new plant, the proposed project goes directly to Ford's plant engineer's office. At Ford all industrial building is developed through this department's 85-man architectural-engineering force. (During the height of Ford's building boom in the 1950s, manpower reached a high of 250.)

"We do all the design work that our staff is capable of handling," says J. A. MacAlarney, director of plant engineering. "Working drawings may be farmed out, but it's we who establish the basic design."

"If design work is given out, we first specify such things as bay spacing, truss loadings and types of materials. Ford has a set of standard specifications that we modify to suit each industrial building project," said Mr. MacAlarney.

"In a few special cases we have hired an architectural firm to work out an over-all design concept for us," he said. "Then our men work within this basic framework and specify the type of design. Finally we give the working drawings out to be done by still another consultant."

The plant engineering department also prepares a list of 8 or 10 recommended contractors for a job and submits it to the corporation's purchasing department. From that recommended list, Purchasing selects a contractor on the basis of low bid.

Ford generally hires three contractors on an industrial project—steel, substructure and a general superstructure contractor. The steel company selected, provides the steel, prepares the detail drawings and erects the steel.

Ford hires no subcontractors itself, but to make sure that the general contractor does not shop around after the contract has been signed, he must submit, along with his bid, a list of subcontractors and their cost to Ford. This, said Mr. MacAlarney, insures top quality construction.

Ford's plant engineering department always supervises all field construction projects.

• **Variation among corporations**—Most of the major corporations interviewed by ENR pursue, with modifications, one of the two methods of industrial building described—either the flexible free-wheeling procedure represented by GM,

IF YOU DON'T understand the company you may be trying to sell the wrong people.

or the more centrally controlled procedure as at Ford.

• The Aluminum Company of America's 40-man construction division designs almost all its industrial buildings. Alcoa acts as its own general contractor about 50% of the time, awarding subcontracts. For the rest of the projects it selects an independent general contractor. Alcoa supervises construction through a project manager assigned by the engineering department.

• At Litton Industries, Arthur Gibeaut is head of Facilities Planning, a department that keeps track of building projects, and supervises architectural and engineering and construction work. The company's comptroller handles negotiation of contracts. Litton gives all design work, except for preliminary studies, to consultants. Construction is awarded to a general contractor. Facilities planning performs inspection but no supervision of construction. The design consultant also is at the job site.

• International Harvester does all its industrial design in its 50-man building and engineering service department. Construction is awarded to a general contractor who in turn selects subcontractors. A resident engineer of IH supervises field work.

• Swift and Company's 110-man work force handles most new plant design, but augments large projects with outside design forces. It selects a general contractor who hires his own subcontractors—with the exception of electrical work and construction piping, which is contracted by Swift. A company field superintendent and architect supervise field work.

• Caterpillar Tractor sometimes uses its own architects and engineers, sometimes calls in the services of a professional firm. It selects a general contractor for each job; however, Caterpillar does all earthmoving work. A company man oversees the entire job.

• General Tire & Rubber Co.'s 40-man central engineering staff, headed by Glenn Orr, does all plant layout and machinery placement. It employs an engineering firm for details and final drawings. General employs a general contractor, but supervises construction with company engineers.

• Goodyear Tire and Rubber Co., with 150 people in its engineering division's central group, has in most instances designed its own plants. Exceptions are specialized plants such as chemicals, where the company prefers to call in experts. On large jobs Goodyear never lets a general contract, but rather acts as its own general contractor and awards separate subcontracts. A Goodyear engineer acts as field supervisor.

• At Minnesota Mining & Manufacturing Co., all important building design is handled by the company's 500-man engineering division, headed by C. P. Pesek, vice president for engineering and staff manufacturing. The company does its own design work in order to keep knowledge of its special processes and products out of the reach of competitors. At company headquarters in St. Paul, where plants are constantly at work on development of new products, the central engineering department acts as general contractor as well. It awards subcontracts to outside firms in such a way that each contractor will have only limited knowledge of the plant's function. Work outside the St. Paul area is supervised by resident engineers assigned to the site.

• At General Mills construction is under the supervision of Hans Schmelzer, director of engineering and chief engineer, with headquarters in Minneapolis, Minn. The company does all its own basic design work, and hires outsiders only to help on details. Construction is awarded to a general contractor who also supervises construction.

• Douglas Aircraft Co. relies on the design capabilities of the selected architect-engineer. The company does no design work on its own. Harry Mayer, Douglas' manager of control, selects the design firm. When a general contractor is selected, Douglas supervises construction through each division's office of plant engineer.

• North American Aviation's supervisor of facilities planning, W. C. Hobbs, rides herd on the building programs of the company divisions. Hobbs hires the design consultant and approves the site utilization plan. Then the division works out details with the consultant. Divisions do no design work themselves but maintain close coordination with the architect-engineer. The project is awarded to a general contractor for construction.

• At Jones & Laughlin Steel Corp. about 10% of total cost of new construction involves the structure itself;

bulk of the expenditure is for manufacturing facilities inside. When needed, the company's chief engineer awards design work to an architect, who also supervises erection of the building. Small projects are erected by the company's maintenance force. Large jobs go to a general contractor.

• E. I. duPont de Nemours & Co., Inc. and Eastman Kodak Co. were unique among the organizations interviewed. Each handles almost every facet of industrial building construction with its own forces. All major projects are conceived, planned, designed and erected by company personnel.

The key unit at Kodak is the Engineering, Construction Maintenance and Utilities Organization. At the duPont company it's the Engineering Department, headed by M. F. Wood, that does all new building. When subcontracts are needed, duPont is willing to let out about 25% of its construction work under close supervision.

Advantage of using inside forces: Complete integration of all phases of the project is cited as a big time and money saver.

• **How they buy materials**—Contrary to popular belief, it is the corporation's engineer, much more than the consulting architect or general contractor, who plays the decisive role in selecting building products for industrial structures.

Primary reason cited for this procedure: These men constantly are involved in a building expansion program of one sort or another for the corporation. Also plant engineers, who are experienced in building maintenance, develop strong opinions about the wearing qualities of products. The feeling among management therefore is that the company's own engineers can best select the building materials that meet the specialized needs of the corporation.

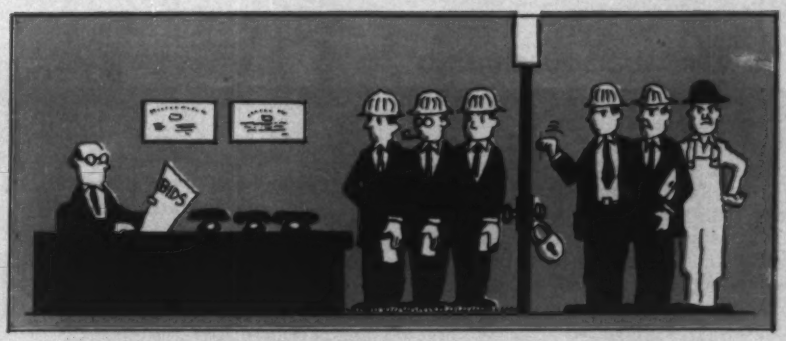
This attitude is prevalent even among many companies that let out their design work to a consulting firm.

Other reasons:

• "Our engineering division supervises material selection both as part of cost control and to provide a degree of family resemblance in the appearance of company buildings throughout the nation," said a Minnesota Mining & Manufacturing Co. engineer.

• A company like Alcoa likes to "call all the shots on materials to be used," because, "wherever possible we specify aluminum on our own buildings. We often experiment with new kinds of aluminum construction materials before they actually are on the market."

• The desire to maintain quality control over materials is another factor in keeping building material selection under corporation control. Ford Motor Co., which selects its own products, uses its extensive automative testing laboratories to test structural material as well.



CONTRACTORS who get invitations to bid, are chosen from the corporation's special builder list. Those not on the list don't get a chance at the job.

Some organizations prefer to let the architect make the initial selection of building products, but then give final authorization to the company engineering staff. At Douglas Aircraft Co., for example, the job consultant selects and proposes a list of building materials; Douglas' engineer then reviews this list and specifies actual materials to be used.

A company also may control selection of material to a large extent by presenting the architect with a particularly detailed set of standards before design gets underway.

A few organizations still prefer to let the consulting design firm select the building materials. North American Aviation, for example, believes that determination of building materials legitimately lies within the province of the building's designer. The company controls selection only in the sense that it holds the purse strings and that its division engineers occasionally will call for specific materials.

For the building product manufacturer, the situation can be confusing. Unless he is aware of the procedure of a particular corporation, he can spend countless hours trying to sell the wrong people.

As a general rule of thumb, the purchasing of materials by large industrial companies follows a similar pattern to their purchasing of design and construction. The company that exerts tight control over construction in the design and building stage also is likely to be the one where corporation engineers select materials. The company that is more flexible in design and construction more readily delegates selection of structural materials to the consulting architect or even the general contractor.

Using our previous examples, General Motors and Ford:

If General Motors' real estate department designs an industrial building, then the company engineers select the building materials to be used. If, however, the design of a building is delegated to an independent architectural-engineering firm, then that firm specifies the materials to be used.

At Ford, where all design work is closely controlled by the company, materials selection is exclusively under the jurisdiction of the plant engineering department.

Ford, moreover, not only determines selection, but also actually buys considerable quantities of building products. "We place our own steel order and buy any other material that will be used in large quantity on a job, such as electrical gear," said Mr. MacAlarney. As a mass buyer, Ford gets a better price.

Most companies, however, relegate actual purchasing to the general contractor.

As to types of materials selected, some corporations continuously search out new and better building products, and are willing to experiment with an untried product where size of installation is limited. Such companies offer a good opportunity for a manufacturer to introduce a new product to the market.

When a company does decide to use a new material, it maintains a close quality check on it for some time before using it in large quantity. The material is likely to be subjected to rigid laboratory testing before further acceptance.

Western Electric is representative of the more experimental organizations. "We pioneered the extensive use of gypsum roof deck poured on glass-fiber boards for roofs, and now use it in many of our buildings," said H. V. Schmidt, WE vice president of plant design and construction. "And one of the first large-scale installations of grease-proof asphalt tile took place at our Indianapolis plant in 1950."

Other industries, though, prefer to stay with tried and tested materials.

And there are just a few companies where "reciprocity" forms the basis for selection of materials—not what's good building practice or what's new.

(Turn the page)

• **How to get a contract**—If you are an architect-engineer firm or contractor who wants to design or build for an industrial corporation, but you have never worked for the corporation before—selling yourself could be tough.

Consulting firms used by the corporation are selected mostly by reputation, convenience of working with the company, and on the basis of contacts within the corporation.

For selection of contractors, most major corporations keep a formal or informal list of builders whom they invite to bid. Culling of contractors is done when the list is made. Unacceptable contractors don't get a chance to bid.

How can a builder get on the list? The best way, according to top corporate engineers, is to send credentials stating: past experience, financial responsibility, complete record of personnel, labor relations, and building projects currently underway. The qualifications then will be carefully checked by the corporation.

A design consultant should introduce himself to a corporation in a similar fashion.

But acceptance of credentials doesn't necessarily mean a contract.

One company has talked with an estimated 50 engineering firms in the past 10 years and not hired a single new one during that time. And some companies, having once found a satisfactory builder and consultant, prefer to use these favorites again and again instead of taking a chance with an untried organization. Since construction bids for industrial organizations are frequently a private affair, you can't always tell whether or not a corporation plays favorites.

There is a bright side to the picture, though. Many corporations are genuinely eager to hear from new builders and architects-engineers. When a company is about to build a plant in an area of the nation far from the home office, it prefers to deal with local builders. Often the corporate engineer doesn't know who is available in the area, and so welcomes letters of introduction.

And many image-conscious corporations like to work with new design firms that have imaginative ideas about an industrial building's appearance.

Once invited to bid on a job, a contractor is selected from a group of 5 to 10 bidders on the basis of low bid. Awards are usually for a fixed price. Occasionally crash-program bids are put on a cost-plus basis.

Alcoa is one of the few firms that selects its contractors by negotiation.

• **A look at work conditions**—Because major industrial companies continuously spend large sums of money on their never-ending building programs, they naturally are more quality and cost-conscious than the average client. They know better what they want and how to get it. They are demanding.

The designers and builder are under the constant vigilance of a corporation's engineering, real estate or purchasing department. On occasion the builder may be watched over by all three.

On the other side of the coin, the large industrial corporation's intensive building experience tends to make it more realistic and reasonable about the possibilities of design and construction.

The prime annoyance reported by builders and engineers working for major corporations is that "there are too many supervisors on a construction job." Although the general contractor and architect both may supervise construction, the ever-cautious corporation engineer frequently will assign his own men to supervise as well.

In a few instances, the contractor, the architect, the corporation building engineer and a representative of the corporate manufacturing division all can be found at the job site overseeing the work of a dozen construction workers.

The major gripe of design firms employed by large corporations is that the role an architect plays in actual design often is more restricted than expected. Although he may get full credit for design, the architect must work within the limits carefully circumscribed by the corporation engineers. A good part of the basic planning and details may already have been prepared by the engineer's department.

Sometimes, complains one consultant, "the architect is relegated to putting a few lines on paper and signing his name. That's all the company want him to do and that's all he does."

As more and more mechanization becomes the trend in industrial buildings, the job of builder and designer becomes more difficult. In addition to conventional building they must cope with dust control, minute tolerances and extreme environmental problems.

Despite these problems, the competition for industrial building awards remains keen. For in return for the headaches, the profits are great and the reward is a good, steady customer.

DO YOU QUALIFY?

Are you a contractor who'd like to participate in construction projects of major industrial corporations? If so, can you answer this questionnaire satisfactorily? (The questions are a composite of those used by industrial corporations when selecting builders.)

1 — What is the size of your business? Have you limited yourself to contracts under $100,000 or are you able to handle larger contracts?

2 — Have you demonstrated capabilities in handling projects of the size in question?

3 — How efficient is your organization? Show past work records and include references from previous employers.

4 — What is your financial credit rating?

5 — What is your current backlog of work? Have you extended your commitments beyond the capacity of your workforce?

6 — What is your annual volume of work?

7 — What type of equipment do you use? Is it safe? Do you have the proper riggings, compaction equipment, etc.?

8 — Is your personnel well-trained? Do you have graduate engineers, registered architects on your staff? Are your superintendents properly trained to report to engineering management?

9 — What is the quality of products that you use in construction?

10 — How accurately do you estimate costs and price your product?

11 — Will the job be finished on time?

12 — Do you pay your bills promptly?

13 — Can you be bonded?

14 — Are you a progressive company? Do you test new materials and ideas and put them to use?

DUST-FREE ROOM is used for growing germanium crystals for semiconductors in a new Bendix Corp. plant.

For Electronics: Quick-Change Interiors

The electronics industry has been expanding its production facilities at a terrific rate principally because of the development of new products. The bulk of current production of many companies in this field is devoted to products unknown five years ago.

These companies generally fit initial production of a new product into space in an existing plant. But in a year or two both the need for increasing output of that item, plus the need not long after for starting production of another new product, make necessary an addition to the plant—and frequently of new buildings to permit efficient production of all items.

The Hewlett-Packard Co., instrument manufacturer of Palo Alto, Calif., is a good example. In 1950, it spent a little over $200,000 on research and development; in 1959, fifteen times as much. Result: A multitude of new products.

Hewlett-Packard develops as many as 20 new instruments in a 12-month period. Last year, 65% of its total shipments were of products developed since 1954.

Industrial buildings for these rapidly growing electronics companies differ in many respects from those for other industries: Interior space must be readily adaptable for changing production requirements. Provision must be made for easy expansion. Air conditioning is a must. And frequently rooms must be built that have closely controlled temperature and humidity and are kept practically free of dust.

Here are some examples of the current crop of electronics plant:

• **Dryer than a desert**—Special controls and equipment had to be developed for a semiconductor products plant built for Bendix Aviation Corp. at Holmdel, N. J. They were needed to virtually eliminate dust and vibration from critical production areas and to maintain very low relative humidity.

Flexibility in use of space is provided by large unobstructed floor areas; columns are spaced 40x50 ft and clear height below trusses is 14 ft. Mechanical facilities, including process water mains, mechanical and electrostatic filters and other air handling-equipment, are set between the trusses. Fluorescent fixtures are suspended from the steelwork. Large equipment, such as dry-air units, a 500-ton centrifugal compressor and two 250-bhp hot-water generators, are located in a mechanical room.

The 72,000-sq-ft building, on a 118-acre site, is enclosed with brick and aluminum sandwich panels and has a continuous band of aluminum windows along its 362-ft front. In addition to manufacturing facilities, it will house engineering and research facilities, offices and an auditorium.

A 50x25-ft room in the building must be maintained at extremely low humidity. To prevent moisture from penetrating through its enclosure, it has been enveloped by a polyethylene vapor barrier, built into the masonry walls, floor and ceiling. The low-humidity condition is maintained by recirculating air, mixed with fresh air, through a rotating, multibed dryer, with silica gel as the dessicant. The air is then passed over a direct-expansion cooling coil and returned to the room.

The evaporative condenser for this system is on the roof. It is automatically protected against freezing by thermostatic controls that, at 35 F, shut off the makeup water and drain the tank and exposed water line. Additional protection is provided by tracing the water line with a hot gas pipe to the condenser.

Another unusual installation is a compressed air system that will supply either plant air or air with a dewpoint of −100 F. Key element of this installation is a unitized dry-air system consisting of an automatic supply-air unit with twin condenser and drying equipment. Each compressor and dryer, and auxiliaries, are capable of delivering 147 cfm of dry or wet air, or a mixture, at 85 to 95 psig.

The two water-cooled, vertical air compressors are non-lubricated. Single-stage and double-acting, these reciprocating units deliver the compressed air, oil free, through a shell-and-fin tube

aftercooler to the wet-air receivers. From there, the air either is supplied to the plant system or delivered through hard copper tubing to activated-aluminum dryers, then to storage in a dry-air receiver.

The plant is supplied with unusually pure water, deionized to have an electrical resistance of 10 million ohms. Well water is pretreated both for this purpose and for the potable and process water supply. It is pumped through two sodium zeolite softeners, then treated with caustic soda—thus removing undesirable iron, reducing the carbon-dioxide content and raising the pH, prior to storage in a 100,000-gal spherical tank. Provision was made for future chlorination.

The demineralization system is composed of two duplicate trains. Each consists of a cation unit, an anion unit and a mixed bed or polishing unit and is served by acid and caustic tanks. Water is fed from the storage tank through a water meter to the cation unit, which converts salts to acids. The acid water passes through the anion unit, which removes acids. Result: water with less than 5 ppm of dissolved solids. This water then is pumped through the mixed beds, where any salts or acids still present are eliminated.

Also noteworthy is the double filtering of conditioned air supplied to critical manufacturing areas. Fresh and recirculated air is first passed through renewable filters. The mixture then goes through electrostatic filters.

The Austin Co., Cleveland, were the engineers and builders.

• **Ultraclean rooms**—A 50,000-sq-ft engineering building built for the Minneapolis-Honeywell Semiconductor Products Division in Riviera Beach, Fla., has 8,500 sq ft of ultraclean rooms. They require three-stage air filtration.

The structure is the first of three in a new research and development center. A 90,000-sq-ft factory and 10,000-sq-ft administration building will be added next year, to integrate all phases of engineering and production.

The 150x330-ft, single-story engineering building has a structural steel frame and is enclosed with brick, glass and porcelain-enameled metal. Floors and the insulated roof are concrete. Air conditioning is accomplished with a 400-ton unit and humidity is precisely controlled with an electric dryer.

In addition to the clean areas, the building also features radiofrequency-shielded spaces. It is supplied with 37 utilities, including several inert, passivating and reduction gases, double-deionized conductivity water, high vacuum and pure air lines.

ULTRACLEAN ROOM in C. P. Clare Co. plant will be used for making new relays.

Relative humidity of 30% is maintained in the clean rooms and 5% in some laboratories. The clean or "white" rooms, some of which are as large as 43x52 ft, serve as semiconductor assembly areas. Such work previously could be done only in small, sealed, reach-in cabinets, because of the exacting requirements.

Each entrance to the building is equipped with shoe-cleaning machines. These consist of a metal grate and motor-driven nylon brushes, which are actuated by a step on the grate to clean the shoe bottoms.

Anyone entering the clean rooms must change to dacron coveralls, hats and hair covers, and washable shoes. They then must pass through three airlocks connected by interlocked doors, with a positive pressure to insure air flow from the clean rooms outward. The final airlock contains an air shower designed to remove lint or dust particles from the clothing.

Floors in the clean rooms are vinyl sheet. Walls are finished with 4x10-ft panels of a new U.S. Plywood product —a mineral-enameled asbestos-cement called Glasweld—held by an epoxy adhesive and stainless steel molding. The surface of these panels has low static buildup, which inhibits dust adhesion, and high resistance to penetration of moisture, heat, abrasion and most chemicals.

Fluorescent lighting is set above a white, acrylic-plastic diffuser. Set in an aluminum grid, the plastic forms the complete ceiling. Doors are plastic covered. (Paint or varnish could not be used.) Thus, the room is virtually airtight.

Supply air to these rooms first passes through a roll-type prefilter, an electronic air cleaner and an absolute-type afterfilter. It is introduced to the rooms through a diffuser set in the ceiling. Air is returned through the hollow partitions and a plenum above the ceiling to the air-handling equipment.

Ellerbe and Co., St. Paul, Minn., was the architect-engineer. Hunter Construction Co., West Palm Beach, Fla., was the general contractor.

A new building being constructed for the Electronics Division of Chance Vought in the Great Southwest Industrial District between Dallas and Ft. Worth also will have a white room with special entry facilities. Personnel will enter a locker room to change to white surgical clothes. They then will go into a 7x5-ft air-wash room.

This room has a series of 1½-in. nozzles jutting from the ceiling and also from four triangular ducts in each corner of the room. The nozzles, aimed at the center of the room, eject at least 3,000 cfm of air. Exhaust air is filtered to remove particles as small as 1 micron before it is recirculated.

Doors to the air-wash room have electrically timed switches. Anyone entering has to remain in the wash five minutes before the door to the clean room opens.

The clean room, supplied with virtually dust-free air, is 25x36 ft and will be used in assembly of space-vehicle electrohydraulic units and other precision items. Conditions in the space will be maintained at 78 F. Air will be exhausted through ¾x10-in. slots flush with the floor level and recirculated through a filtering system before return to the room. Air will be moved at 1,050 cfm.

Walls in the air-wash and clean room are concrete block surfaced with ¼-in. plywood with a plastic covering. Lighting is fluorescent, above a glass ceiling.

The 280x275-ft, single-story building is of steel-frame construction. Columns are spaced 30x35 ft and open-web joists span between rolled sections continuous

over the tops of the columns. Exterior walls, virtually windowless, are beige brick. The roof is lightweight concrete on permanent metal forms. Two concrete hyperbolic-paraboloids span the broad approach to the entrance.

The air-conditioned, 80,000-sq-ft building cost $1.5 million. Electrical and mechanical costs were about two-thirds of this—about double normal. Equipment will cost an additional $2 million. The building occupies a 12.5-acre site in anticipation of a 175,000-sq-ft expansion in the next few years. Chance Vought also holds an option on another 7.5 acres, to allow even greater growth.

Beran and Shelmire of Dallas were the architects. Great Southwest Corp. is the general contractor.

Another new ultraclean room of note is in an 18,000-sq-ft addition to the C. P. Clare Co. plant in Chicago. It will be used to manufacture a new sealed contact reed relay. For the purpose, it will eventually contain six machines that will automatically enclose each pair of magnetically operated contacts in a hermetically sealed glass capsule in an atmosphere of inert gas.

A high-pressure air-conditioning unit insures a temperature of 72 F in the room at all times. Air is completely changed every three minutes.

Before return to the room, the air is double filtered. The combination, including a dry-type electronic precipitator on the inlet side of the air-conditioning unit, removes 99.97% of all particles more than 0.3 microns in diameter.

Before entering the manufacturing section, employees walk across a metal grill that gives the shoe bottoms a preliminary cleaning. Next, they cross a mechanical shoe-cleaning mat, where nylon brushes, operating at 432 strokes per minute, gives shoes a second cleaning. Then, coveralls and caps are donned in a pressurized room with interlocking doors, which prevent air leaking into the white room. Shoes are cleaned once again by a brush and vacuum mat before entry into the critical relay assembly area.

Walls of the white room are mostly of glass. Ceiling and floor are plastic protected. Fluorescent lamps, providing 100 ft-c at working level, are recessed into the ceiling and have glass lenses set in neoprene gaskets, to prevent dust from entering.

Rapp and Rapp of Chicago were the architects. Joseph T. Carp, Inc., Chicago, was the general contractor.

• **Rapid-change plant**—Assembly lines can be changed speedily in Hewlett-Packard's two new production buildings in the Stanford Industrial Park, Palo Alto, Calif. To permit this, the buildings were erected without partitions or permanent fixtures, which would break up the interior space.

CHANGEABLE PRODUCTION LINES are daylighted in Hewlett-Packard plant.

The new structures are part of a $5-million quadrangle that also includes a research and development building and an administration building. Constructed on a hilly, 50-acre site, they were designed to take advantage of the slopes.

Each of the two production buildings, of steel-frame construction, are 274x153 ft, two stories high, with about 72,000 sq ft of usable area. The two floors of the production buildings line up; however, because of the slope of the land, the second floors of the production buildings are at the level of the first floors of the research and administration buildings. And a 55,000-sq-ft storage area below the first floor of the administration building is at the same level as the first floors of the production buildings, making for easy access.

To take advantage of daylighting, the buildings have glass walls on the north side. Each has seven 200-ft-long sawtooth skylights, with the glazing oriented five degrees east of north, for sun control. The only time sunlight enters a working area during the year is after 5 pm for about two months in summer.

Fluorescent lamps provide the lower floors with 75 to 120 ft-c, depending on area requirements. Fluorescent lights on the upper floors are controlled by a photoelectric switch system, which turns them on and off according to the natural-light level; a roof-mounted time-delay device prevents rapid fluctuation of switching due to passing clouds. The system reverts to manual control at 5 pm and back to automatic the following morning at 8 am.

Since Hewlett-Packard, a large manufacturer of electronic test instruments, is constantly developing new products and currently is producing about 400 separate items, emphasis had to be placed in the design of the production buildings on flexibility in use of space. So working areas are kept open—no partitions—and columns are spaced about 50 ft c-c. Assembly lines may be taken apart and put together with great rapidity.

Work benches are movable. And extensive use is made of portable "roller-skate" conveyors, along which products can be easily moved from station to station.

Air in the plant is conditioned and electrostatically filtered.

Clark, Stromquist, Potter and Ehrlich of Palo Alto were the architects. Williams & Burrows of Belmont Calif., was the general contractor.

• **A lot for the money**—Somewhat more than 100,000 sq ft of floor area has been provided for American Electronics, Inc., at Fullerton, a Los Angeles suburb, at a cost of only $10 per sq ft. Yet the plant is air conditioned and contains many unusual features required for production of the company's newest products.

The project consists of two buildings on a 10-acre site. One, with a little over 90,000 sq ft of floor, area will be occupied by the Precision Power and Electromechanical Divisions. The first division produces high-frequency power-conversion equipment and solid-state devices; the second, miniature ac-dc motors, blowers, clutches and generators, as well as motorized packages combining precision motors with mechanical devices to customer specifications. Prototype infrared and radar-seeker heads for a new generation of missiles are being readied for production. The second building is for the American Laboratories Division.

The engineering and manufacturing

COLLAPSIBLE FORMS shaped concrete hyperbolic-paraboloid roof of United Control Corp.'s new plant.

building consists of two rectangular, one-story units lying along the sides of a two-story, L-shaped office section. The structure is of steel-frame construction, with tapered steel girders and wood rafters. Bays are 20 x 50 ft. Minimum clear height is 18 ft. Roof insulation consists of multiple layers of reflective aluminum.

The production areas are windowless. Walls are precast concrete panels. Panels at the rear walls are removable to permit expansion of the plant. Interior walls for executive offices are fixed; all other partitions are movable.

A 277-v fluorescent lighting system was selected to provide 100 ft-c in the offices and 80 ft-c in the factory.

Offices are air conditioned by a multizone unit with gas-fired duct heaters and refrigerated cooling coil. Factory areas are air conditioned by several similar, but single-zone, air units.

The plant has extremely high electrical power requirements. Aluminum conductors were chosen to save both money and weight—important because they are supported by the roof framing. Power is brought in through a single meter, to take advantage of rate savings.

Operations require 400 and 1,000-cycle power, direct current and variable frequency, as well as regular 60-cycle power. Electricity will be bought at 4,160-v, three phase, and will be converted, metered and distributed by the companys' own equipment. A radial distribution system will be used. Three 750-kva and one 500-kva dry-type unit substations will convert the 4,160-v power to 480-v, three-phase, four-wire for the secondary distribution system.

The low construction cost ($996,317, exclusive of power-conversion and air compressor equipment, landscaping and interior decoration, but including 2½-ton bridge and jib cranes, white room, environmental testing facilities and soundproof rooms) is attributed in large measure to the design procedure adopted. Preliminary studies were made by Stanley S. Seitz, the company's director of industrial engineering, before Eugene Kinn Choy and Associates, Los Angeles architects-engineers, were engaged. Then three prominent contractors were invited to work with Mr. Seitz and Mr. Choy on the design. Many of the cost-saving techniques proposed by the contractors were adopted by the designers. In addition, these early conferences helped anticipate and avoid costly construction mistakes. One of the participating contractors, Lindgren & Swinerton, Inc., Los Angeles, was the successful bidder.

• **H-P roof put up fast**—Reinforced hyperbolic-paraboloids, 36 ft square, were constructed at the rate of five a week for the roof of a $1.6-million electronics plant for United Control Corp. near Seattle.

Speedy and economical construction of the double-curved roof, which is mostly 2 in. thick, was made possible by the use of reusable, collapsible forms. The 63 h-p's required are a major portion of the roof of the 136,000-sq-ft building. Forms for each h-p and its 16-in.-dia concrete column cost 60 cents a sq ft to place and strip.

The plant is one-story-high, except for a 16,000-sq-ft, two-story section. Its second floor is a concrete slab, which was used to support the formwork for the nine h-p's comprising the roof of this section.

Five sets of forms were employed for the h-p's. Each was composed of two symmetrical, collapsible units. Since they weighed 7,000 lb apiece, each half was mounted on a trailer. Collapsed, a unit was slightly less than 10 ft wide, 36 ft long and about 12 ft high.

The forms were framed with steel I-beams and channels. These supported a steel grid faced with ⅜-in. plywood given three coats of plastic paint. One unit had an hydraulic "tree" containing the lifting mechanism.

Towed to the site, the two halves were pulled into position by a four-wheel-drive truck and locked together. As a first step the trailers were leveled. Next, the leaves were elevated with a 1,000-lb portable hydraulic system with three 3-in. cylinders. Then, telescoping shores were installed to support the edges of the leaves at the proper elevation. After that, the wheels were removed from the trailer for use on other units.

Two men were used for erection of the forms and two others for stripping. Setting up the forms took about six hours; stripping and moving them to a new location took two to three hours.

Reinforcing, consisting of 4 x 4-in. welded wire fabric, was placed the day after the forms were erected, and concrete was cast the following day. Forms usually were stripped about three or four days later.

The 9 to 12½-ft-high columns that support the h-p's incorporate drains, services and utilities.

Floors were concreted and precast concrete wall panels positioned after all the h-p's were completed.

The collapsible forms were developed by Shell Forms, Inc., a subsidiary of Proctor Products Co, Inc., Edmonds, Wash. Cawdrey & Vemo were the general contractors. Paul Hayden Kirk & Associates were the architects and Worthington, Skilling, Helle & Jackson were the structural engineers.

AUTOMATED FACTORY for rocket propellant, surrounded by an embankment, operates without personnel in or near it.

Revetments Shield Missile-Fuel Plant

A 23-ft-high earth embankment for blast and fire protection almost entirely surrounds the Aerojet-General Corp. production building near Sacramento, Calif. The facility turns out solid rocket propellant for the Polaris missile.

The only breaks in the embankment are a narrow opening for entry of personnel at one corner and a timber barricade in one side where the end product is brought outside.

The plant, which cost $1.38 million to construct, consists of several buildings in addition to the production facility. Located outside the revetment, these include a raw-material receiving building, a process-control house, an equipment building and a casting building.

• **Explosion protection**—The production building, containing two separate, parallel production lines, is 125 x 40 ft by two stories high, with hoppers and weighing equipment protruding above. The propellant is made by a closely controlled continuous-flow process, in contrast to the batch paste-mixing method used previously. The process is automatic; no men need be inside the revetment when the plant is in operation. If monitoring equipment in the control house shows a discrepancy from the fuel specification, the plant is shut down and repair men enter.

Two types of construction are used for the production building—reinforced concrete and steel framing. The concrete section includes four areas enclosed in reinforced concrete walls, 12 in. thick for fire and explosion protection.

Two of the barricaded areas are equipment rooms, one at each end of the building. They house controls that keep the building interior at 72 F and 10% relative humidity.

• **No hands needed**—The two production lines are in the other barricaded areas. In these mixing rooms the crucial combination of propellant "premix," oxidizer and polyurethane base takes place. Propellant components are fed to the mixing room from the receiving building through pipes, which are carried on bridges over the revetment to the hoppers atop the structure. Liquid components are pumped; solids are pneumatically conveyed.

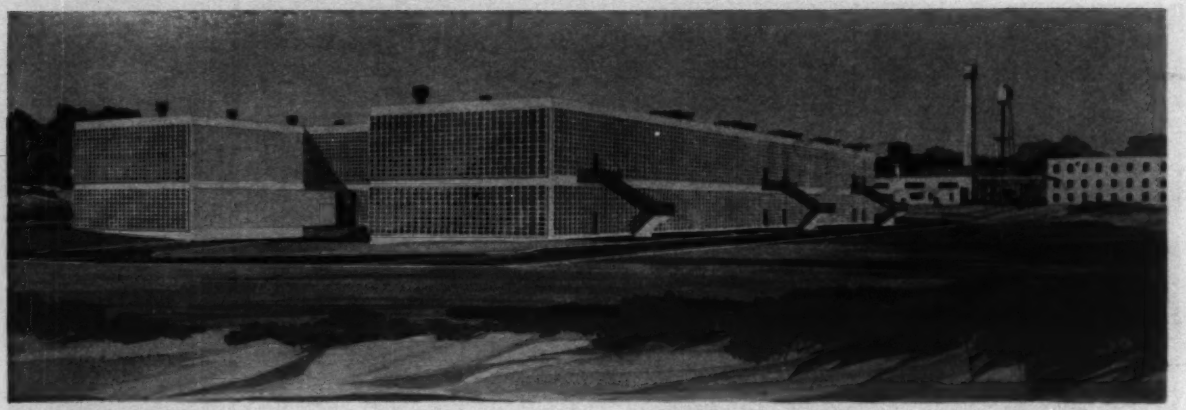
A complex of service piping runs around the perimeter of the building. It provides water, brine, steam, compressed air, dried air and nitrogen, brought from the equipment building.

The finished product is discharged through two pipes near the middle of one side of the building. A sand-filled timber revetment replaces the earth embankment there, to shorten the distance traveled to the loading dock by the still-warm propellant. Caught in carts, the material is rapidly hauled to the casting building nearby. It must be cast in rocket engines within minutes lest it cool and solidify.

The timber barricade is 10 ft thick at the base, 3 ft at the crest. It is estimated to have the same resistance to blast as the embankment. Both are 23 ft high—2 ft higher than the highest point in the building, where explosive matter is stored or handled.

The steel-framed section of the building has an exterior of corrugated asbestos-cement siding backed up with a continuous aluminum membrane and gypsum wallboard. These walls are attached to steel studs and are protected against chemical attack by a phenolic coating.

The plant was designed in 90 days by Aetron Division of Aerojet-General and completed 150 days later, spurred by a crash development program touched off by a speedup in the Polaris missile timetable. Baldwin Contracting Co., Inc., Marysville, Calif., was the general contractor.



PRECAUTIONS taken to reduce hazards of gas buildup have a visible effect on the design of Parke, Davis' chemical plant.

Plant Screened in Concrete and Plastic

Walls of a two-story chemical processing plant for Parke, Davis & Co., being constructed at Holland, Mich., consist of a grillwork of precast concrete. The openings in the grill contain "popout" plastic windows.

The building is H-shaped in plan, roughly 195 x 340 ft by 35 ft high. Its 120,000 sq ft of floor area provides space for production, warehouse, shipping and offices. Construction is reinforced concrete, precast units being used wherever advantageous.

• **Trend to precasting**—This is in line with the pharmaceutical company's present practice for all its new plants. The engineering division finds that "concrete lends itself readily to unique architectural treatments while maintaining the cost advantage of more conventional materials" and that generally there is a savings in using precast walls.

Examples: San Francisco Branch—warehouse walls and roof of prestressed concrete. Chicago Branch—warehouse roof framed with 90-ft prestressed spans. Los Angeles Branch—warehouse walls of precast concrete faced with ceramic tile on the exterior.

The Baltimore Branch, in Towson, Md., is of special interest. Concrete roof girders with curved tops project above the roof deck. Supported on columns 49 ft apart, the scalloped members range in length up to 245 ft. Prestressed double-tees, spanning 49 ft between them, were covered with 2 in. of lightweight-concrete insulation to form the roof deck.

• **Avoiding future troubles**—For the new chemical plant at Holland, the design was influenced by considerations in addition to esthetics and initial cost. Concrete was chosen to avoid corrosion problems. The wall construction was selected to vent the interior swiftly if an explosion should occur, though precautions have been taken to prevent such a possibility. And for flexibility in making changes, movable precast members were picked to support equipment.

The building is supported on piles. The first floor, finished with an epoxy, is a 12-in.-thick reinforced concrete slab supported on the pile caps, which serve as column capitals. The second floor in the warehouse section, which is in the center of the structure and used for storage of raw materials, is framed with cast-in-place concrete columns and girders. Construction of the surrounding area is flat slab, with drop panels and column capitals.

Tanks and reactors in this processing section pass through the second floor. They are supported on easily moved precast beams.

Roof framing consists of prestressed concrete girders and precast columns. Bays are 75 ft long by 12 to 20 ft wide.

The exterior vertical grill was precast in story-height panels, 4 ft wide. It is composed of 4-in.-thick bars that form openings 18 in. wide by 12 in. high. The plastic windows set in these openings are designed to pop out at a pressure of 6 to 7 psi. First-story grilled panels are 14 ft high; second-story panels, 18 ft.

To prevent dangerous conditions from building up, the plant's ventilation system provides five air changes per hour to production and other hazardous areas.

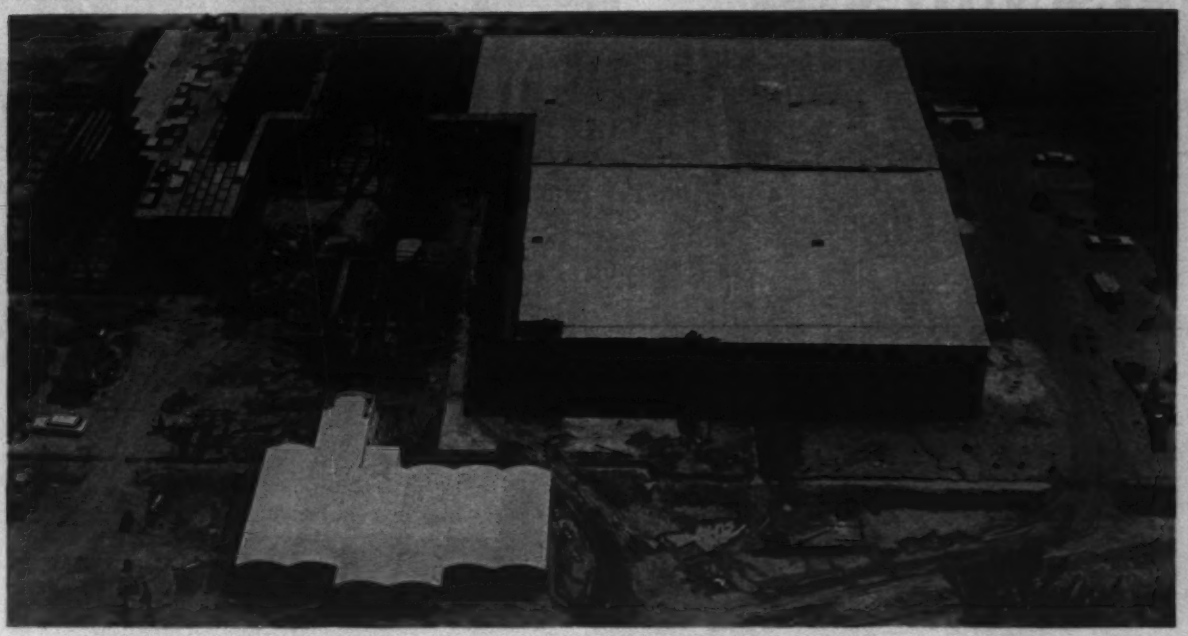
Additional supply and exhaust capacity are available to give ten air changes per hour in emergency or for summer ventilation. Air in the warehouse and other nonhazardous areas is changed twice an hour.

Fume-removal systems are integrated in the ventilation system. These evacuate heavy fumes from first-floor drainage trenches and light fumes from ceiling level. An independent scrubber acts as a point-of-emission fume-removal system and helps keep the plant free of fumes.

• **Two power sources**—The plant is supplied with 4,160-v electricity from its own turbogenerator operating in parallel with a municipal power plant. Secondary electrical distribution, three-phase, 480/277-v, is brought in from an outside substation to motor-control and lighting panels.

Lighting panel centers feed explosionproof mercury-vapor lighting fixtures. Dry-type transformers are employed to provide proper voltages to handle fluorescent lighting in nonhazardous areas; incandescent lighting in the mercury-vapor lamp area, the incandescent lamps being used during the mercury-lamp "restriking period"; and various 120-v equipment.

The Holland plant was designed by A. M. Kinney, Inc., in conjunction with the Parke, Davis Construction Engineering Department. Darin & Armstrong of Detroit was the general contractor.



BARREL ARCHES and walls are made of plywood, framing is timber in U. S. Plywood's new particle-board factory.

Wood Plant for Making Wood Products

The United States Plywood Corp. used wood framing, walls and roofs in building its Novoply plant in South Boston, Va., on the Dan River. The materials were selected deliberately as a "standing display of the company's products of significance to the wood industry."

Novoply is a three-ply board consisting of dense outer layers of resin-impregnated, thin wood flakes bonded to a core of coarse wood flakes. The particle board was introduced in Switzerland in 1947 to utilize lumber mill wastes. But the product to be produced in U. S. Plywood's new plant will be made of fresh-cut logs.

The company picked a 40-acre site contiguous to about 250,000 acres of southern pine, from which the plant will draw its raw material.

The plant consists of a one-story, 80,000-sq-ft manufacturing building and a one-story office building. The two are connected by an enclosed corridor.

• **Stressed-skin roof**—Six barrel arches, each spanning 16 ft and from 46 to 91 ft long, comprise the roof of the office building and corridor. The arches are made of prefabricated curved sandwich panels, with a 30-in. rise in the 16-ft span.

Each panel has an outer face of $\frac{3}{8}$-in. exterior-grade sheathing plywood and an interior face of $\frac{1}{4}$-in. exterior-grade sanded plywood. The core is a $\frac{3}{4}$-in. resin-impregnated paper honeycomb. Nearly all the panels used for the office roof were 4 ft wide.

Installation was fast as soon as local carpenters learned how to handle the panels. The basic problems were to keep the outside edge straight along the entire roof and to maintain a tight fit. The carpenters got a good fit by using furniture extension clamps, which tightened when the panels were tapped with a mallet.

After all the panels were placed and crickets inserted between arches, 1-in. glass-fiber insulation was set on top. This was covered with builtup roofing sprinkled with white marble chips. The panels serve as the ceiling in some offices; in others, an acoustic-tile suspended ceiling is used.

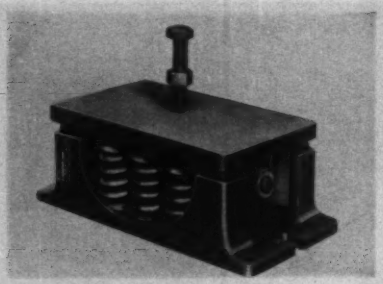
The arches are supported on laminated wood edge beams carried by wood columns. Thus, walls and partitions are not load bearing. The exterior walls are exterior-grade douglas fir plywood with deep, parallel grooves. They are stained to look like redwood.

Offices are enclosed with various types of prefinished hardwood plywood, Novoply and textured plywood panels. Doors and moldings are made of plywood to match the paneling. In the lobby, one wall is covered with a green and white vinyl sheet on Novoply backing. Floors are concrete, covered with vinyl tile.

• **Wood framing**—The manufacturing building is framed with glue-laminated wood trusses and girders, with spans up to 75 ft. Rafters and columns also are wood.

The roof deck is $\frac{3}{4}$-in. exterior-grade plywood coated with paint. Exterior walls are made of plywood with phenolic-resin-impregnated fiber sheets permanently fused to its faces, providing durable paint surfaces. These panels were installed with a horizontal lap. Around the top of the building is a translucent, green-colored, glass-fiber-reinforced acrylic band, 8 ft high, for daylighting the interior. The floor is a 6-in. concrete slab.

Lockwood-Greene Engineers, Inc., New York City, designed the building. C. L. Lewis, of Lynchburg, Va., was the general contractor.



SPRING ISOLATOR, used under many of the machines in a new plant . . .

. . . was also inserted under the supports of a high-energy shaker to suppress vibration.

Plant's Own Products Eliminate Vibration

Vibration, shock and noise could have been a serious problem in a plant constructed for the Korfund Co., Inc., in Westbury, N. Y. But it isn't.

The company's research and development laboratories share the same building with the manufacturing department, and the researchers have to run shock and vibration tests not far from where delicate tests and machining are done. But there is no trouble because the company makes vibration and noise-control equipment and puts it to good use in its new plant.

The building is 132 x 275 ft, one story (16½ ft) high. Framing is structural steel, with 32 x 26-ft bays. Girders are continuous over the tops of the columns. Exterior walls are brick; partitions concrete block. The floor is reinforced concrete.

The plant is air conditioned, and even for this purpose, the company used its own products to good advantage to diminish vibration and noise. It inserted its sound traps in the ducts to reduce the sound of air turbulence to negligible proportions. It sprayed duct insides with its vibration-damping compound—a visco-elastic material that suppresses vibration and drumming. And it suspended the air-conditioning equipment, ducts and pipes from the roof framing on its vibration hangers.

Throughout the plant, all equipment capable of producing noise, shock and vibration, as well as equipment that has to be protected against external disturbance, are isolated by company products —steel springs, cork, rubber, glass fiber, hydraulic systems, flexible connectors, and acoustical panels and rooms. Thus precision grinding operations are carried on adjacent to a stamping press without the grinder being disturbed—for both machines are mounted on spring isolators.

These shock-absorbing devices consist of steel or cast housings containing one to twelve oil-tempered, high-carbon or chrome-vanadium steel springs. The upper and lower members of the housing are held in their relative position against lateral movement by four resilient inserts.

Equipment to be isolated is set on the top plate. This loads an adjusting bolt, which transfers the load to a plate compressing the springs. The adjusting bolt also is used to level the equipment, eliminating leveling jacks, shims or wedges.

The isolators eliminate the need for bolting to the floor most types of machines—grinders, jig borers, lathes, air and refrigeration compressors and most punch presses. Result: Equipment can easily be shifted to meet changing production needs. Only machines with large unbalanced forces, having heavy overhanging weights or pulled by belts from separately mounted motors need be bolted. For maximum absorption of structurally transmitted noise, waffle-embossed synthetic-rubber pads can be placed under the isolators.

Especially troublesome machines, such as high-energy vibration shakers, are set on floating foundations within soundproofed enclosures made of the company's acoustical panels. The shaker is mounted on a massive, concrete inertia block with steel beams protruding horizontally from the sides. The block is sunk in a pit with its top flush with the building floor. When the steel beams are jacked up to permit insertion of the isolators under their ends, the bottom of the block is raised off the bottom of the pit.

Acoustical panels enclosing noisy machines are of sandwich construction, 4 in. thick. They have glass-fiber insulation between an inner facing of perforated steel and an outer facing of heavy-gage steel, which has an undercoating of the company's vibration-damping compound.

Irving Hirschman was the architect and Allen Spinner the consulting engineer. Skodnek Industries, Inc., was the general contractor.

Job for Autocar... This six-wheel drive C5566 gets the mix to the site regardless of weather or terrain.

New 6 x 6 mixer goes through thick and thin . . . thanks to Autocar

This is really an all-weather, all-terrain job—one of those where nothing less than an Autocar would do.

In a hole or up a hill, on shifting sand or in sticky gumbo, this all-wheel-drive Autocar delivers the mix on schedule . . . a schedule that construction men know they can depend on day in and day out.

Choice of an Autocar means that your truck will be custom-engineered to its specific job. Precision building plus Autocar quality means that it will stay on the job longer with greater economy. Why settle for less than the "World's Finest?"

White-Autocar comprehensive service throughout the U. S. A.

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pa.

In closing months, 99 trucks ran night and day to reach a goal of 17 million miles over test loops

683 times "around the
it's the great

November 30th marked the end of test traffic in the $27,000,000 pavement test sponsored by the American Association of State Highway Officials (AASHO). More than 1,100,000 load applications and hundreds of millions of scientific readings were recorded before the last truck rolled off the track at Ottawa, Illinois. The fleet of trucks—from farm-size pickups to 54-ton semi-trailers—piled up an impressive 17 million miles of travel. On the test loops, 836 separate sections repeat nearly 200 different pavement combinations to provide a wide range of measurements.

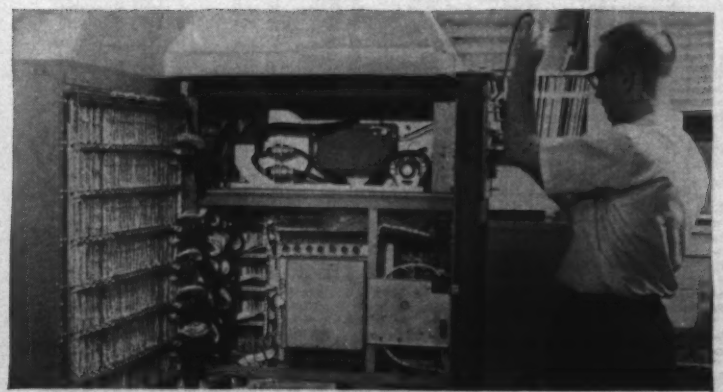
Every effort has been made to carry out the road test by the most scientific methods ever used. Automatic electronic instrumentation and recording equipment was designed to assure unbiased findings of highest reliability. Giant computers are analyzing and evaluating the mountains of statistics accumulated.

Administered by the Highway Research Board of the National Academy of Sciences—National Research Council, the National Road Test will answer the big questions in today's highway construction. The significant findings will influence highway design and construction across the nation.

Engineers, officials and legislators will have invaluable help in designing pavements for the Interstate System—and roads and streets of all classes.

PORTLAND CEMENT ASSOCIATION *A national organization to improve and extend the uses of concrete*

world" in two years... National Road Test!



Scientific readings by the millions have been analyzed by AASHO computers. "Statistically unassailable" facts on pavement design will result.

MOST SIGNIFICANT TEST OF PAVEMENT TYPES OF ALL TIME!

The National Road Test is sponsored by the American Association of State Highway Officials.

Financed by the States and the District of Columbia, the territory of Puerto Rico, the Bureau of Public Roads, the Automobile Manufacturers Association, the American Petroleum Institute, with cooperation and assistance of the Department of Defense.

Administered and directed by the Highway Research Board of the National Academy of Sciences—National Research Council.

Operated by a staff of engineering and technical specialists.

Materials Prices

Monthly Market Quotations By ENR Field Reporters

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE† — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity Common backing	Straight hard	LIME Per ton, in paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized
Atlanta	$186.10ps	$154.95pkbs	$309.90ps	$348.65ps	.....	.....	$33.20mu	$36.70mu	$36.50AA	$28.50AA	$28.50AA
Baltimore	217.00	231.00	434.00	491.00	602.00	690.00	36.00	41.00	35.80	23.40	.....
Birmingham	135.00pss	152.00pss	.....	303.00p	376.00p	465.00p	27.00ff	38.00jj	38.25mm	20.87mm	26.33gmm
Boston	232.00†mm	248.00†mm	463.25†mm	536.00†mm	.....	.....	43.50p	58.00p	42.00§	34.00§	.....
Chicago	137.00ll	149.00ll	280.00ll	.....	.....	.....	32.00	34.00	1.00llaa	.90llaa	.....
Cincinnati	179.00mmyy	190.00†mmyy	355.00†ddmm	390.00†mmm	422.00†mmm	500.00†mmyy	48.00jk	47.00jk	29.10†mm	29.10†mm	29.10†mm
Cleveland	205.00tt	219.00tt	.....	465.00tt	.....	709.00tt	43.25tt	47.25ggtt	32.75ptt	28.00ptt	.....
Dallas	162.00	162.00	318.75	387.00	472.50	585.00	30.00	51.00	43.58	25.32	28.00
Denver	170.00	185.00	310.00	310.00	390.00	442.00	35.00zz	54.00	50.00p	44.00p	48.00p
Detroit	257.00mm	274.00mm	514.00mm	582.00mm	767.00mm	876.00mm	53.50pmm	54.00pmm	38.10mm	30.10mm	40.10mm
Kansas City	158.00	158.00	312.00	312.00	400.00	500.00	34.00	34.00	36.26	34.26	29.76
Los Angeles	r	r	r	r	r	r	40.00uu	.....	38.00mmll	38.00mmll	39.00mmll
Minneapolis	208.00pe	225.00pe	452.00pe	225.00pwe	.....	.....	49.50rre	58.00ype	50.00bbe	40.00bbe	52.00bbde
Montreal	168.78Rwqeo	180.93swqeo	325.00swqeo	220.00qeo	400.00qeo	.....	48.25hll	56.30hll	39.00	22.00	13.35
New Orleans	178.00	178.00	371.25	371.25	.....	.....	42.00	55.00	36.00p	36.00p	.....
New York	185.00h	197.00h	294.00ch	297.00hn	.....	.....	46.00p	.....	40.00p	38.00p	.....
Philadelphia	208.40ss	222.30ss	416.90sszz	500.20ss	.....	.....	40.00mm	45.00mm	40.00mmp	21.50	21.50
Pittsburgh	200.00t	213.00t	400.00t	453.00t	607.00t	693.00t	42.00t	40.00t	30.00t	26.00t	34.00t
St. Louis	180.00mmpp	190.00pp	385.00pp	410.00ppp	439.00pp	621.80pp	44.00mmpp	45.50ppR	1.00ssapp	.80ssapp	1.35 ssapp
San Francisco	156.85*mm	177.10*mm	235.30dd*mm	159.40qqmm	.....	.....	43.00*mm	43.00*mm	29.24mm	29.24mm	31.74mm
Seattle	235.00pt	270.00pt	490.00pt	265.00pwt	.....	.....	57.00t	71.00t	53.00bbt	38.00bbt	4.50mbbt
Toronto	169.00rr	185.50rr	360.00rr	281.50frr	405.00rr	.....	25.00rr	65.00rr	42.00mm	38.00mm	38.50mm

*§ F.o.b. yard. *** F.o.b. plant Stockton. *† F.o.b. yard Roxbury. *a Smooth. *b $4.80 del. *c 8 x 12 x 12 in.-8 coll. *d Pulverized hot. *e less 5% disc., 10th., 12 x 12. *f(80% common. *g Lumps, $28.72. *h F.o.b. trucks, job site N.Y.C. *i 60 lb sacks. *j Truck load or over. *k $1.00 discount per M, 10 days. *l Red face. *m Per bbl. 100 lb. processed. *n 7¾ x 7¾ x 12. *o Mason's double hydrated pressure. *p Truck lots. *q Provincial and Municipal tax extra (8%). *r Not used: earthquake danger. *s 8 x 16 x 12. *t less 2% disc., cash. *u Incl. Federal tax. *v Sand lime. *w 8 x 8 x 12. *x dumped. *y Chi common. *z Pebble; 80 lb sack. *aa 50 lb sack. *bb LCL. *dd 8 x 12 x 12. *ff 80% common. *gg Smooth. *hh less 25¢ disc., cash. *ii F.o.b. plant. *jj rough; smooth: $40. *kk 3½ x 11½ x 11½. *ll less 2% disc. 10th. *mm less 2%, 10 days. *nn F.o.b., L. A. *oo less 2%, 20 days. *pp add 2% sales tax. *qq 8 x 8½ x 11½. *rr 2½% disc., 10 days. *ss 5% disc., 10 days. *tt less 2% disc., 15th. *uu less 50¢/M, 10 days *vv 4000 pcs. and over. *R revised.

PAINT, ROOFING—F. O. B. CARLOAD LOTS

	RED LEAD Per 100 lb. In 600 lb. (Approx.) bbl. F.O.B. Plant Dry a C	WHITE LEAD Per 100 lb. In 100 lb. cases In oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum c	Ferric Oxide d	ROOFING SUPPLIES; Carload lots f.o.b. factory Rolls, slate surfaced, 65-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 380 lb. bbl. per ton
Atlanta	$13.75ggJO	$24.00ggJ	$3.50	$3.86	$3.31	$2.90kk	$2.25kk	$2.85kk	40.67kk	$85.35kk
Baltimore	17.50gg	24.00	3.00	4.40	3.50	3.06	3.67	4.04	.50	54.00
Birmingham	26.00†J	29.00†J	3.90J	3.40J	....	2.95†mm	2.17ii†mm	3.17ii†mm	.78ffmm	49.00emm
Boston	24.95†oomm	26.90†mmm	....	....	....	3.30q	2.45q	2.79q	.55q	58.00q
Chicago	15.25rJqqqq	24.00†J	....	....	....	3.45ukk	2.38ukk	3.00ukk	48.00bbukk	57.70†kk
Cincinnati	15.25†JO	24.00†J	....	....	....	2.74mm	1.88mm	2.42mm	.58ymm	55.96Hmm
Cleveland	25.65†	26.90†	2.61ggP	2.81sqqq	3.45qqq	2.65q	1.81o	2.35o	.39p	49.00gg
Dallas	22.50	23.50M	....	3.25B	....	3.00u	3.00s	3.00o	.470	66.00kk
Denver	23.85n	24.00	3.70	5.10	3.70	2.71	1.93o	2.80o	.50ff	50.00
Detroit	15.75r	24.00rr	2.70mm	3.95mm	2.70mm	2.82mm	1.81ommll	2.23ommll	.58ffmm	49.00mm
Kansas City	26.90lqqoo	25.65	3.99	3.42	3.01	3.00mm	2.50mmm	2.50mmm	.55y	.....
Los Angeles	16.25yy	22.00	3.30n	4.50n	4.20n	3.40nkk	2.40nikk	l	.75nykk	l
Minneapolis	17.25N	21.50kk	....	....	....	2.50kk	1.81Akk	2.36Akk	.52kk	50.00kk
Montreal	19.45O	26.00uttt	5.53Dff	6.55aff	5.10kffi	5.40	4.65f	4.65f	1.60	4.40su
New Orleans	23.00Jpp	24.00J	....	....	....	2.78	1.98	2.85	.680	45.50
New York	15.75ooO	29.75	....	....	....	2.79zz	1.91zzo	2.46o	.52s	49.00*
Philadelphia	15.75Omm	19.00mm	3.35mm	3.90mm	2.65Rmm	4.70	3.60	2.20	.55	50.00
Pittsburgh	21.50mggJ	24.00J	2.20†EJ	2.25†FJ	2.25†GJ	2.90sH	2.15sH	2.15H	.56H	55.00H
St. Louis K	25.65†m	26.90	....	....	....	3.22immm	2.35kkK	2.84kkK	.44gK	59.20K
San Francisco	26.70mm	26.90mm	3.20mm	4.30mm	3.50mm	2.87mm	1.72acimm	2.50mm	.46ff	54.00
Seattle	13.35HO	24.00H	....	4.19ccfJ	....	3.70qccH	3.06kccH	....	.50qc	....
Toronto	14.45	20.65	5.18J	6.18J	5.96J	3.50	2.90aaz	3.00s	.91f	65.00A

*† Delivered. * Note: Red lead in oil 50% higher than white lead in oil. ** Aver. wt. approx. 425 to 550 lb drums. *a Red lead prices change frequently due to pig lead price changes. *b U.S. War Dept. Spec. 3-49A. *c ASTM Spec. D266-31. *d 80% minimum ferric oxide. *e Per 108 sf roll. *f Per 432 sq ft. *g F.o.b. yard Roxbury. *h Per roll, 65 lb. *i Net carload prices, Minneapolis and vicinity. *j 45 gal containers. *k Over 80% ferric oxide. *l Not used. *m 100 lb. keg. *n F.o.b. city. *o Per 80 lb roll. *p 5-drum, 50 gal each. *q Per 90-lb roll. *r F.o.b. factory, Chicago. *s Truckload. *t Incl. Federal tax. *u Per 90-lb square. *v Per ton. *x Ready-mixed. *y 55-gal container. *z Drums. *aa 15 lb. *bb Roofers coating and cement. *cc LCL, truck delivery. *ee Asphalt pitch in 100 lb package *ff 5-gal drums. *gg F.o.b. factory. *hh Incl. freight. *ii Per 324 sf roll. *jj Asbestos roof coating. *kk less 2% disc., 10th. *mm less 2% disc., 10 days. *oo 100 lb bbls. *pp 50 or 100 lb bags. *qq 500 lbs or more *rr F.o.b. plant, Detroit. *ss 50 lb bbls. *tt 25 lb kegs. *uu 250 lb bbls. *xx Sept.: Rolls revised to $2.75, Asph. Felt revised to 1.71. *yy Sept. revised to $12.00. * zz Sept. revised to $2.80. *A 400 lb barrels. *B ASTM Spec. D962-49. *C 95%. *D Std. black. *f Milt. spec.: ETTP27; FTTY81; GTTP31. *H less 2% disc. cash. *I Per 100 lb. *J less 1% disc., 10 days. *K add 2% sales tax. *L CL. *M 1 ton or more. *N under 500 lbs, *O 50 lb. bag.

PLASTER, VERMICULITE AND METAL BUILDING SHEETS & TUBING

	PLASTER† Neat per ton	PLASTER† Gauging per ton	VERMICULITE‡ Home Insulation pellets	VERMICULITE‡ Plaster aggregate	VERMICULITE‡ Concrete Aggregate treated	PERLITE‡ Plaster Aggregate	PERLITE‡ Concrete Aggregate Untreated	ALUMINUM SHEET† Flat .100" th 36"x108" & 42"x144" per lbjt	ALUMINUM SHEET† Corr roof .032" th 35"x12' per shu	STAINLESS STEEL† SHEET-TYPE 302q 2B ga 48"x96'-120" per cwthb	STAINLESS STEEL† SHEET-TYPE 302q 2B ga 36"x120" per cwtmm	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ¾"b	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ¾"c
			per bag of 4 cu ft										
Atlanta	$32.00ss	$42.00ss	$1.55sss	$1.65sss	$1.80sss	$1.65ss	$1.65ss	$0.463nno	$27.17nY	$65.68nzz	$74.43nzz	$0.1762ss	$0.2464ss
Baltimore	24.00	35.70	0.95	1.15	1.15	1.15	1.55	0.462	0.451r	63.00	71.25	0.1600	0.2300
Birmingham	37.00ss	43.00ss	1.55ss	1.55ss	1.60ss	1.27ss	1.27ss	0.459M	9.62K	65.50K	73.00K	0.2000ss	0.2700ss
Boston	24.00	30.00	1.40	1.40	1.40	1.55ss	1.55ss	0.474	25.07pAA	64.42ddssz	72.67dd	0.1762ss	0.2464ss
Chicago	1.45bbtt	1.45bbtt	1.55	1.60	1.60	1.60	1.60	0.564z	33.43p	64.15ee	72.40ee	0.1580	0.2210
Cincinnati	23.85*ss	23.85*	1.75*ss	1.75*ss	1.85*ss	1.85ss	1.90ss	0.514	9.21	61.00zz	71.25zz	0.1723ss	0.2398ss
Cleveland	28.00N	45.00N	1.14ss	1.16ss	1.24ss	1.45ss	1.45ss	0.459as	25.07p	63.33eezz	71.58eezz	0.1580	0.2211
Dallas	34.50	34.50	1.05	1.21	1.37	1.21	1.32	0.469	0.484r	64.09	72.34	0.1665	0.1986
Denver	27.00	27.00	1.50	1.40	1.50l	1.50ss	1.60ss	0.475	10.89	65.32gg	73.87gg	0.1670	0.2345
Detroit	28.00ss	28.00ss	1.27ss	1.34ss	1.43ss	1.45ktt	1.50ktt	0.475a	10.35a	63.00zzz*	71.25zzz*	0.1588	0.2210
Kansas City	30.00	35.00	1.19E	1.21E	1.29E	1.21	....	0.463	34.66ggyyp	67.50K	76.25K	0.1310	0.1480
Los Angeles	27.00tt	28.00tt	1.35ktt	1.20ktt	1.45tt	1.11	1.11	0.459	9.77Z	65.02	73.27	0.1670	0.2345
Minneapolis	35.00F	35.00F	1.65tt	1.60F	1.95Fl	1.40S	1.50S	0.485	16.23	63.61GR	69.61fG	0.1814f	0.2545
Montreal	22.50h	35.50h	1.25h	1.40h	1.60h	1.15s	1.15s	43.95AH	12 10H	65.75H	....	0.1978BB	0.2450BB
New Orleans	34.00	48.00	1.35P	1.35P	1.45P	1.15P	1.15P	0.463	32.68	61.24Y	72.00Y	0.2058	0.2887
New York	27.00	35.00	1.40	1.35	1.40l	1.35	1.40	0.480aT	0.2507aXAA	64.08a	72.33a	0.1580	0.2210
Philadelphia	26.50	33.00ss	1.40ss	1.25ss	1.45ss	1.05ss	1.05qqss	0.465	9.46	63.71	71.96	0.1480	0.2330
Pittsburgh	30.00nn	31.00nn	1.25nn	1.30nn	1.40mm	1.40nn	1.40nn	0.475	10.39	63.00	74.50yy	0.1800	0.1800
St. Louis wu	30.00wu	42.00wu	1.50wu	1.60wu	1.65wu	1.50wu	1.60wuY	0.479	8.77	63.39Kmmyy	69.39yuyy	0.1590fmss	0.2210fmss
San Francisco	29.50ss	30.50ss	1.38ss	1.38ss	1.50ss	1.38ess	1.58ess	0.575	10.83	65.00K	77.25K	0.1725	0.2415
Seattle	42.40nn	45.60nn	1.55nn	1.35knn	1.85nn	1.50k	....	0.50D	10.75D	64.02D	73.27D	0.1510	0.1700
Toronto	.82	1.31	1.55	1.50	1.85	1.20Q	....	0.437	26.00ag	73.74	86.52	0.3063	0.3418

‡truckiots, delivered †fob warehouse *fob city *a delivered *b ½" O.D. *c ⅝" O.D. *d per sf *e 24" x 60" sheet *f per 100 ft *g 5 tons & up: cold roll, anneal & pickled 2B finish *h incl. Federal tax *i add 25¢ for pint of additive *j 1100 & 3003 alloy, mill finish *k bag of 3 cu ft *l not treated with air entraining agent *m 2-10M ft *n fob mill lr equalized with nearest stocking competitor *o 250 sacks or more *p 100 sq ft *q per lb *s 30 lb bag *t 36" x 108"; 10.21 lb/sh; 48" x 144"; 21.7 lb/sh *u 19.31 lb/sh *v 42" x 144" *x 0.11"th *y 27 gauge *aa 16M lb & up *bb Per 50 lb bag *dd add $1.00 cwt boxing *ee 4 tons & up *gg add $2/cwt boxing; $0.75/cwt on skids *hh Theoretical wt for 48" x 96"; 60.4-lb. per sh *ii 300-bag lots *jj 100-lb bag *mm Theoretical wt; 19.7-lb per sh *nn 2% cash *oo skid packed *pp type 304 *qq Philadelphia and suburbs. *rr less 2% disc. 15 days. *ss less 2% disc. 10 days. *tt less 2% disc. 10th. *uu add 2% sales tax. *vv Type N. *xx less ½% disc. 10 days. *yy .021 ga. *zz .061" th. *A Per 100 lb. *C 15M lb. *D less ½% for cash. *E Quantity differential. *F less 5% disc. 10th. *G less ½% disc. 10th. *H Fed. tax exempt. *K less ½%, 10 days. *L 8% disc. 30 days. *M 3003: .032 for 1100. *N less 2%, 15th mo. *O less $2, cash & carry. *P less 2%, 15 days. *Q per ton. *R revised *S add .10 /bag under 200 bags. *T 5000# quantity on 4000# skids. *U 30 Msf quantity; $0.245 in 10 Msf quantity. *X per sq ft. *Y Per sheet. *Z 6,000 lb or over. *AA 30,000 sf or over. *BB Type K

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, MARIE MORAVSIK, ELEANOR QUERET, Reports, J. H. WEBBER, E. R. HUBER, Statistics.

NEW ENGLAND

HEAVY CONSTRUCTION—LB & CA

RHODE ISLAND—State R. I. & Prov. Plants Div. Purchase, State House, Providence,
M. A. Gammino Constr. Co., 728 Valley St., Providence, R. I., CA **$782,861**, est. approx. $800,000, highway work, Greenwich Ave., Bid No. 284 R. I. Contr. No. 6048 F. A. Proj. No. F-013(1), Cranston-Warwick. Bids Oct. 13, awarded Nov. 7. CD 10/21, under LB.

▲ **RHODE ISLAND**—State R. I. Prov. Plants, Div. Purchase, State House, Providence,
M. A. Gammino Constr. Co., 728 Valley St., Providence, R. I. CA **$2,094,372**, relocation Rte. 1, Bid No. 331, Contr. No. 6001, R. I. Fed. Aid Proj. No. F-05(4), South Kingston and Narragansett. Bids Oct. 19. Charles A. Maguire & Associates, Turks Head Bldg., Providence, engrs. CD 10/24, under LB.

BUILDINGS—LB & CA

▲ **James S. Kelliher, Inc.**, 1245 Hancock St., Quincy 69, Mass., CA **$1,026,274** Alternate 1, Proj. M-729 Contr. 7, renovate Cushing HOSPITAL, FRAMINGHAM, MASS. Commonwealth of Mass., Dpt. Mental Health, Div. Bldg. Constr., 38 Chauncy St., Boston, Mass. Bids Oct. 7. CD 10/12, under LB.
Commonwealth of Mass., Dpt. Mental Health, Div. Bldg. Constr., 38 Chauncy St., Boston, Mass., rejected bids Sept. 30, Proj. M-58-10 Contr. 1, BOYS HOME and DORMITORY, W. E. Fernald School, Waverly, WALTHAM, MASS. LB **$777,000**. CD 10/5, under LB.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

▲† **Pennsylvania**—BA About 12/8—U. S. Eng., 2635 Abbottsford Rd., Phila., levees-floodwalls, and pumping station, Lehigh River Flood Control Proj., ENG-36-109-61-17. $4,000,000. CD 9/27.

BUILDINGS—BA

N. Y., Whitestone—SCHOOL—BA 12/8—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures for Public School 193 addn., 152 St. between 11 and 12 Aves., Queens Boro. Plans deposit $25, $10 mechanical trades. CD 1/25.
▲ **N. Y., Midland Beach**—SCHOOL—BA 12/12—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures Junior High School 2, Midland, Bedford and Roundary Aves., Richmond Boro. $3,300,000. Plans deposit $35 general, $15 mechanical trades. CD 10/31.
▲ **N. Y., Huntington**—CHURCH, etc.—BA 12/14—Diocese of Rockville Centre, Diocesan Bldg. Comn., 253 Sunrise Hy., Rockville Centre, N. Y., St. Patrick's church and rectory. $1,000,000. John O'Malley, 1 De Kalb Ave., Brooklyn, Zone 1, archt.
▲† **D. C., Wash.**—OFFICE—BA 12/15—General Services Admin., 7th and D Sts. S.W., Federal Deposit Insurance Corporation Office, 1703 New York Ave. N.W. Total est. $11,500,000. Plans deposit $125. Chatelain, Gauger & Nolan, 1632 K St. N.W., Wash., D. C., and Perkins & Will, 309 W. Jackson St., Chicago, Ill., archts. CD 11/15/59.
▲ **N. Y., New York**—SCHOOL—BA 12/15—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures for Junior High School 133, Stebbins Ave., Rogers Pl., Westchester Ave. and E. 64 St., Bronx Boro. $3,500,000. Plans deposit $40 general, $10 mechanical trades. CD 4/4.
▲ **N. Y., New York**—SCHOOL—BA 12/15—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures Public School 111, Baychester and Crawford Aves., Bronx Boro. $2,400,000. Plans deposit $25 general, $10 mechanical trades. CD 4/4.
▲ **N. Y., New York**—SCHOOL—BA 12/15—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures for Junior High School 133, Stebbins Ave., Rogers Pl., Westchester Ave. and E. 64 St., Bronx Boro. $3,500,000. Plans deposit $40 general, $10 mechanical trades. CD 4/4.
▲ **N. Y., New York**—SCHOOL—BA 12/16—Deputy Supt. of Schools, Bureau of Constr., 42-15 Crescent St., 4 Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures Public School 83 addn. and modernization, 204-245 E. 109 St., Manhattan Boro. $1,500,000. Plans deposit $25 general, $10 mechanical trades. CD 4/14.

BUILDINGS—SLC

▲ **N. J., Newark**—SCHOOL—Diocese of Newark, and Parish Sacred Heart, 1068 South Orange Ave., soon lets contract school. $2,500,000. Emil Schmidlin, 50 Evergreen Pl., East Orange, archts. CD 9/19.

HEAVY CONSTRUCTION—LB & CA

▲ **NEW JERSEY**—State Hy. Dpt., 1035 Parkway Ave., Trenton,
N. J.—Yonkers Contg. Co., Inc., 969 Midland Ave., Yonkers, N. Y., CA **$2,127,704**, paving, etc., 4.978 mi. Interstate Rte. 78 from Central R.R. of New Jersey to Mulhockaway Creek in Jugtown Mountain Area, Hunterdon Co.;
N. J.—Franklin Contg. Co., Rte. 46, Box 176, Little Falls, N. J., CA **$1,071,975**, wid'n., resurf. and bridges 2.469 mi. Rte. 28 Sections 3A and 4A from East St. to Lincoln Ave. boroughs of Bound Brook and Middlesex, Somerset and Middlesex Counties. Bids Oct. 6, awarded Nov. 14. CD 10/10, under LB.
PENNSYLVANIA — State Hy. Dpt., 506 North Office Bldg., Harrisburg,
J. Robert Bazley, Inc., Box 298, Pottsville, Pa., CA **$908,149**, widening existing hy. with grading, drainage variable in width; surfacing existing hy. with bituminous surf. 24 ft. wide, 7,570 ft. T.R. 906, Rostraver Twp., Westmoreland Co. CD 9/21, under LB.

BUILDINGS—LB & CA

Urban Farms, Inc., Franklin Lake Rd., Franklin Lakes, N. J., Owner Builds, **$850,000**, 24 HOUSES, Section 7B, North Gate, FRANKLIN LAKES, N. J. CD 8/23/57, under J. Nevin McBride, as owner.
▲ **Stofflet & Tillotson**, 2043 Eastburn Ave., Phila., Pa., CA **$2,057,000**, three DORMITORIES, DINING HALL, and STUDENT UNION, JENKINTOWN, PA. Beaver College, Jenkintown, Pa. Martin Stewart & Noble, and Robert Allan Class, 117 S. 17th St., Phila., Pa., archts. Allabach & Renis, 16 S. Broad St., Phila., Pa., engrs. CD 10/10, under LB.
▲ **Jules H. Segal & Son, Inc.**, 912 Stratford Ave., Abington, Pa., CA **$2,000,000**, 200 units, APARTMENT, MELROSE PARK, PA. Owner, c/o Sabatino Fishman, archt., 1503 Walnut St., Phila., Pa.
▲ **McCloskey & Co.**, 1620 W. Thompson St., Phila., Pa., CA **$14,500,000**, HEADQUARTERS BLDG., PHILA., PA. Bell Telephone Co. of Pennsylvania, Widener Bldg., Phila., Pa. Bids Aug. 31. CD 9/1.
▲ **Maurice Lichenstein**, 1614 E. Upsal St., Phila., Pa., Separate Contracts, **$2,000,000**, 196 units, 6 APARTMENTS, Route 352, WEST CHESTER, PA. A. R. Hyman, 912 Gilham St., Phila., Pa., archt.
▲ **Allen Engineering Corp.**, 700 Sligo Ave., Silver Spring, Md., Owner Builds, **$2,000,000**, 100 HOMES, in Knollwood, Powder Mill Rd., near Hillandale, HYATTSVILLE, MD. Morton Noble, 2000 P St. N.W., Wash., D. C., archt.
▲ **Wheaton Plaza Regional Office Center, Inc.**, 11160 Viers Mill Rd., Wheaton, Md., Owner Builds, **$2,000,000**, 7 story, 91,000 sq. ft. OFFICE, Wheaton Plaza adjacent to Grand Union Supermarket, WHEATON, MD. A. L. Anderson, 1726 M St. N.W., Wash., D. C., archt. CD 5/3.

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $53,000; other public works $88,000; industrial buildings $110,000; other buildings $400,000. Also Foreign projects of $1,000,000 and more in size of interest to American contractors.

By Regions & Classes of Construction
(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England	**Middle West**
Middle Atlantic	**West of Mississippi**
South	**Far West**
PROPOSED WORK	
Water Supply	**Public Buildings**
Sewers, Waste Disposal	**Mass Housing**
Bridges	**Commercial Buildings**
Streets & Roads	**Industrial Buildings**
Earthwork, Waterways	**Unclassified**

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.
SOON LETS CONTRACT: SLC

LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

CD dates shown are of Construction Daily Issue in which last previous report was published.
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

†	Federal Government
▲	Project of $1,000,000 or over.
ENR	Engineering News-Record
CD	Construction Daily

For additional reports see Construction Daily.

SOUTH

BUILDINGS—BA

S. C., Clemson—DORMITORIES—BA 12/15—Clemson College, Clemson, two dormitories. Over $750,000. Plans deposit $75. W. E. Freeman, Jr. & Associates, 226 W. Washington St., Greenville, archts. CD 10/11.
▲ **Fla., Jacksonville**—SHOPPING CENTER—Bids Asked—Normandy Towers Shopping Center, c/o Stockton, Whatley, Davin & Co., 100 W. Bay St. (selected list of bidders), 100,000 sq. ft. shopping center. $1,000,000. Akel, Bell & Pearson, 237 W. Forsyth St., archts. CD 7/28.

BUILDINGS—SLC

▲ **Ala., Huntsville**—SHOPPING CENTER—Owner, c/o The Engel Realty Co., 1921 1st Ave. N., Birmingham, soon lets contract 192,000 sq. ft. shopping center. $2,500,000. Stevens & Wilkinson, 157 Luckie St. N.W., Atlanta, Ga., archts. CD 11/1.

HEAVY CONSTRUCTION—LB & CA

Vecellio & Grogan, Inc., Box 31, Beckley, W. Va., LB **$728,464**, asphalt runway; LB **$887,582**, concrete runway Benedum Airport, Bridgeport, CLARKSBURG, W. VA. The Benedum Airport Auth., Courthouse, Clarksburg, W. Va. Bids Nov. 7. CD 10/25.
▲ **S. J. Curry & Co.**, P.O. Box 1436, Albany, Ga., CA **$1,557,000**, sewage treatment plant addn., Contract D, at South River Sewerage Treatment Plant, ATLANTA, GA. City, City Hall, Atlanta, Ga. Bids Oct. 26. CD 11/1, under LB.

BUILDINGS—LB & CA

▲ **W. M. Chappell**, 1346 Good Hope Rd. S.E., Wash., D. C., CA **$1,000,000**, Marriott MOTOR HOTEL addn., U. S. Rte. 1, ARLINGTON, VA. Hot Shoppes, Inc., 5161 River Rd., Bethesda, Md. Walter Bucher, 918 Sligo Ave., Silver Spring, Md., archt. Bids Oct. 20. CD 10/20.
▲ **Southeastern Constr. Co.**, 1121 Quarrier St., Charleston, W. Va., CA **$1,029,500**, men's DORMITORY, Marshall College, HUNTINGTON, W. VA. State Bd. Educ., Capitol Bldg., Charleston, W. Va. CD 9/1, under LB.
▲ **William C. Vick**, 3930 Western Blvd., Raleigh, N. C., CA **$1,184,000**, Longview Gardens SENIOR HIGH SCHOOL, RALEIGH, N. C. City Bd. Educ., 601 Devereau St., Raleigh, N. C. Bids Nov. 1. CD 11/7, under LB.
▲ **Frank J. Rooney**, 405 S. Dale Mabry Highway, Tempa, Fla., CA Est. **$1,500,000**, DEPARTMENT STORE, CLEARWATER, FLA. Allied Stores, Inc., 401 5th Ave., New York, N. Y. CD 10/20.
Wehr Constructors, Inc., 2127 S. Floyd St., Louisville, Ky., LB **$614,700** (11 bidders), general contract 2 story, 55,000 sq. ft., brick Bond-Salisbury ELEMENTARY SCHOOL, LOUISVILLE, KY. Louisville Bd. Educ., S and Hill Sts., Louisville, Ky. Bids Nov. 16. CD 9/22.
▲ **Steadman Constr. Co.**, 413 E. Market St., Kingsport, Tenn., CA **$1,000,000**, 3 story, 76,000 sq. ft. OFFICE, KINGSPORT, TENN. Tennessee Eastman Co., Eastman Rd., Kingsport, Tenn. CD 11/4.

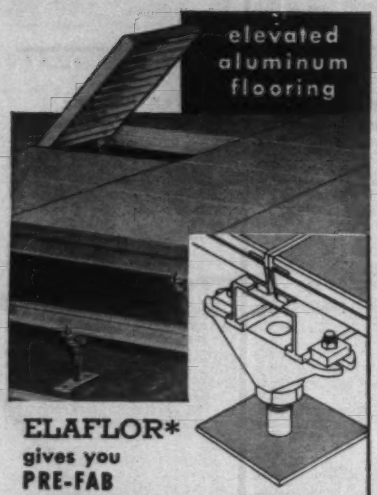
MIDDLE WEST

BUILDINGS—BA

▲ **Ill., Chicago**—SCHOOL—BA 12/12—Bd. Educ., 228 N. LaSalle St., Pirie School, $1,000,000. Samuelson & Sandquist, 6330 N. Cicero Ave., archts. CD 6/11/57.
▲ **Ill., Chicago**—SCHOOL—BA 12/19—Bd. Educ., 228 N. LaSalle St., Zone 1, school, 67th St. and Green St., $1,000,000. Shaw, Metz & Assocs., 208 S. LaSalle St., Zone 4, archts., CD 12/10; Kershaw school, $1,000,000. Ganster & Henninghausen, 222 Washington St., Waukegan, archts. CD 6/11/57.
▲ **O., Canton**—COUNTY JAIL—BA 12/19—Bd. Comrs. Stark Co., Courthouse, county jail, $2,266,000. Firestone & Motter, 1412 Cleveland Ave. N. W., and Harry Frank, 203 Market St., archts. CD 11/9/59.
▲ **O., Dayton**—SCHOOL—BA 12/20—Bd. Educ., 348 W. 1st St., Dunbar High School, $2,000,000. Plans deposit $50. Freeman A. Pretzinger, 1155 Reibold Bldg., archts. CD 11/20/59.
▲ **Ill., Rockford**—HOSPITAL—BA 1/16—Third Order of St. Francis, 530 NE Glen Oak Ave., Peoria, 225 bed hospital addn., St. Anthonys Hospital, 1411 E. State St. $4,400,996. W. Butler Co., 1300 Minnesota Bldg., St. Paul, Minn., archt.-engr. CD 8/15.

HEAVY CONSTRUCTION—LB & CA

▲ **Herlihy-Mid Continent Co.**, 407 S. Dearborn St., Chicago 5, Ill., CA **$1,188,119**, Schedule B-three



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railroad underpasses, two rein.-con. railroad culverts, hy. culvert railroad roadway embankment, sewer, drainage, street work, Calumet Sag Channel Navigation Dist., BLUE ISLAND, ILL. Baltimore & Ohio Chicago Terminal Railroad Co., C. E. Jackman, ch. engr., 1302 Baltimore & Ohio Bldg., Baltimore and Charles Sts., Baltimore 1, Md., Bids Aug. 26. CD 9/28, under LB.

▲ **S. J. Reynolds Co.**, 6101 W. 28th St., Cicero, Ill., CA $5,124,879, Fueling System, O'Hare Airport, Spec. 80.85-60-120, CHICAGO, ILL. Dpt. Purchases, City Hall, Chicago 2, Ill. Bids Nov. 9, awarded Nov. 17. CD 10/27.

BUILDINGS—LB & CA

▲ **Sam W. Emerson Co.**, 1836 Euclid Ave., Cleveland 15, O. CA Est. $1,000,000, PARISH HOUSE, CLEVELAND, O. Old Stone Church, Public Square, Cleveland 13, O. Awarded Nov. 14. CD 10/19, under LB.

▲ **Humel Constr. Co.**, 17706 Miles Ave., Cleveland 28, O. CA Est. $1,000,000 WAREHOUSE, WARRENSVILLE, O. Heinens Inc., 17021 Chagrin Blvd., Cleveland 18, O. Bids Oct. 26. CD 10/20.

▲ **A. L. Jackson**, 300 W. Washington St., Chicago, Ill., LB $5,983,269, (10 bidders), demolition and foundation for FEDERAL COURT HOUSE and OFFICE, CHICAGO, ILL. General Services Admin., 219 S. Clark St., Chicago 4, Ill. Bids Nov. 17. CD 10/24.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—LB & CA

▲ **MISSOURI**—State Hy. Dpt., Jefferson City,
Mo.—**W. J. Menefee Constr. Co.**, 2500 West 16 St., P. O. Box 30, Sedalia, Mo., CA $1,274,472 graded earth, culverts, 2-24 ft. conc. pavts. 4.527 mi., Jasper Co.; CA $741,764 graded earth, culverts, 2-24 ft. conc. pavts. 2.281 mi., Newton Co.;
Mo.—**Howard Ready-Mixed Conc.**, 1504 N. Osage Sedalia, Mo., CA $1,733,301 graded earth, culverts, 2-24 ft. high type conc. pavts. 1-24 ft. high type pavt. 5.537 mi., Marion Co.;
Mo.—**J. A. Tobin Constr.**, 3701 Rainbow Blvd., Kansas City, Kan., CA $2,294,283 graded earth, culverts, 2-24 ft. conc. pavts. 4.269 mi., Jasper Co.;
Mo.—**Koss Constr. Co.**, 510-Iowa-Des Moines Bank Bldg., Des Moines, Iowa CA $855,987 graded earth, culverts, subgrade shoulders, 1-24 ft. conc. pavt. 10.343 mi. Christian Co. Garnd total $6,899,807. Bids Oct. 27, awarded Nov. 1. CD 11/4, under LB.

▲ **State Park Bd.**, Jefferson Bldg., 100 E. Capitol Ave., Jefferson City, Mo., received no bids Nov. 4, lease and construct hotel, lodge, swimming pool, etc. 50 acre tract in Table Rock State Park, Stone Co. MISSOURI. Initial Development to cost more than $1,000,000. CD 10/12.

SOUTH DAKOTA—State Hy. Dpt., Pierre,
Van Buskirk Constr. Co., 215 Benson Bldg., Sioux City, Iowa, CA $933,740, on I 90 from ½ mi. west of US 77 west, 3.570 mi., I 90-9(4), Minnehaha Co. Bids Sept. 22. CD 9/28, under LB.

▲ **OKLAHOMA**—State Hy. Dpt., Capitol 5, Oklahoma City,
Okla.—**Worth Constr. Co.**, 300 Greenleaf Ave., Fort Worth, Tex., CA $1,009,983, c. conc. paving 5.092 mi. I-35, Noble Co.;
Okla.—**Burbank Rock Co.**, Ponca City, Okla., CA $526,337, grading, draining, 7.601 mi. I-35, Love Co.;
Okla.—**A. K. McBride Co.**, 2914 O St., Fort Smith, Ark. CA $543,635, grading, draining 4.471 mi. US 270 Pottawatomie Co. Grand total $2,079,955. Bids Sept. 23. CD 9/27, under LB.

▲† **U. S. Eng.**, P. O. Box 1220, Galveston, Tex., cancelled bids to have been opened Dec. 8, dredging Morgan Point to vicinity Baytown, Houston Ship Channel, Texas, Harris Co., ENG-41-243-61-27, $2,500,000. CD 11/1.

▲ **Atlantic, Gulf & Pacific Co.**, 905 Citizens State Bank Bld., Houston, Tex., LB $1,273,348, dredging Sabine-Neches waterway, Sabine-Neches canal, realignment Sabine River Channel and Orange Turning Basin, Orange and Jefferson Counties, Texas, and Cameron Calcasieu Parishes, Louisiana, CIVENG-41-253-61-8, TEXAS-LOUISIANA, U. S. Eng., Box 1229, Galveston, Tex. CD 11/10.

▲ **E. E. Farrow Co.**, Box 13186, Dallas, Tex., CA $1,024,296, water system, sanitary sewers, incl. disposal, KILLEEN, TEX. City, City Hall, Killeen, Tex. CD 11/11, under Sewers, Waste Disposal and Water Supply.

BUILDINGS—LB & CA

Adolfson & Peterson, 2817 Bryant Ave. S., Minneapolis, Minn., LB $808,100, (10 bidders), JUNIOR-SENIOR HIGH SCHOOL, BROOKLYN CENTER, MINN. Bd. Educ. Independent School Dist. No. 286, Brooklyn Center, Minn. Bids Nov. 15. CD 10/20.

▲ **Tommeraasen Constr. Co.**, 4343 Avondale Rd., Edina, Minn., Owner Builds, $1,500,000, 53 HOMES, Hy. 169 west of Tracy Rd., EDINA (MINNEAPOLIS P. O.), MINN.

▲† **Senora Corp.**, First National Bank Bldg., Tulsa Okla., LB $1,700,209, (10 bidders), PETROLEUM RESEARCH CENTER for Dpt. Interior, Bureau of Mines, BARTLESVILLE, OKLA. General Services Admin., 1114 Commerce St., Dallas, Tex. Bids Nov. 17. CD 10/25.

Dunning Constr. Co., 420 N. Hudson St., Oklahoma City 2, Okla., CA $991,274, DOCTORS MEDICAL BLDG., Northwest Hy. at Baptist Hospital, OKLAHOMA CITY, Okla. Baptist Laymens Corp., 1201 N. Robinson St., Oklahoma City, Okla. Bids Aug. 25. CD 9/1, under LB.

▲ **W. B. Uhlhorn**, P. O. Box 2028, Harlingen, Tex., LB $1,467,000, est. $750,000-$1,250,000, HOSPITAL addns., imprvs., BROWNSVILLE, TEX. Mercy Hospital, 1040 W. Jefferson St., Brownsville, Tex. Bids Nov. 10. CD 10/26.

▲ **Wilkins Constr. Co., Inc.**, Box 286, Boulder, Colo., CA $1,035,078, est. $1,300,000, 1 story, 87,258 sq. ft., SOUTH JUNIOR HIGH SCHOOL, AURORA, COLO. School Dist. No. 28-J, 1085 Peoria, Aurora, Colo. Andersen & Koerwitz, 655 Broadway, Denver, Colo., struct. engrs., Marshall & Johnson, 280 S. Pennsylvania, Denver, Colo., mech. engrs. Bids Nov. 9, awarded Nov. 11. CD 11/15, under LB.

FAR WEST

HEAVY CONSTRUCTION—BA

† **Calif., San Francisco**—BA 12/14—Dist. P. Wks. Office, 12th Naval Dist., San Bruno, sewage disposal sys. for Treasure Island Yerba Buena Island, Naval Station, Treasure Island, N8y 29276 Spec. No. 29276/60. $500,000-$1,000,000. CD 10/2/59, under Unclassified.

HEAVY CONSTRUCTION—LB & CA

▲ **Connolly Pacific Co., Grafe-Calahan Constr. Co., Brayer Electric Co. and Chas. L. Harney, Inc.**, 575 Berry St., San Francisco, Calif., LB $10,378,333 (9 bidders), third two lane 3,371 ft. long, 28 ft. roadway 4 ft. sidewalk tunnel, Sign Rte. 24 through Berkeley Hills at Caldecott Tunnel at East City limit of Oakland, Alameda Co., CALIFORNIA. State Div. Hys., 1120 N St., Sacramento, Calif. Bids Nov. 16. CD 9/28.

▲† **Hitachi New York Ltd.**, 501 5 Ave., New York, N. Y., LB $1,379,732 (7 bidders), Central Valley Proj., furnishing, installing two 74,444 kva. generators for Clear Creek Power Plant, Redding, Shasta Co., Spec. DS 5404, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Denver Federal Center, Denver, Colo. Bids Nov. 10. CD 9/27.

A. Teichert & Sons, 103 North E St., Stockton, Calif., LB $727,825 (8 bidders), 320,000 sq. ft. runway extension, aircraft parking apron, paving, drainage, etc., Stockton Airfield, Spec. 29R-11L, STOCKTON, CALIF. Bd. Supervs. San Joaquin Co., Courthouse, Stockton, Calif. Reinard Brandley, 1320 Howe Ave., Sacramento, Calif., engr. CD 3/10.

BUILDINGS—LB & CA

O. E. Anderson, Inc., P.O. Box 251, San Jose, Calif., LB $966,106 (9 bidders), 30,000 sq. ft., rein.-con., 50-bed General HOSPITAL, GILROY, CALIF. Bd. Dir. Wheeler Hospital Assn., Gilroy, Calif. Stone, Marraccini & Patterson, 536 Mission St., San Francisco, Calif., archts. CD 10/14/59.

Wayne Pendergraft, Inc., P.O. Box 296, Saratoga, Calif., CA $848,242, 27,000 sq. ft. each wood frame, stucco Geo. C. Payne ELEMENTARY SCHOOL and Gussie Baker SCHOOL, Campbell, SAN JOSE, CALIF. Moreland Elementary School Dist., 4610 Strawberry Park Dr., San Jose, Calif. Bids Sept. 7. CD 9/14, under LB.

Falzone Constr. Co., 1523 Kalakaua Ave., Honolulu, Hawaii, CA $750,000, 64 unit COOPERATIVE APARTMENT, incl. swimming pool parking for each unit, 1515 Kewalo St., HONOLULU, HAWAII. Progress Hawaii, Inc., 431 Nahua St., Honolulu, Hawaii.

▲ **Hirano Brothers**, 931 University Ave., Honolulu, Hawaii, CA $2,860,000, 130 HOMES, WAIPAHU, HAWAII. Ben Mau Assocs., 116 S. King St., Honolulu, Hawaii. Richard Miyazono, 3669 Woodlawn Ave., Honolulu, Hawaii, archt.

CANADA

BUILDINGS—BA

▲ **Que., Montreal**—VETERANS AFFAIRS—BA 1/4—Dpt. P. Wks., Hunter Bldg., Ottawa, Ont., 5 story, Dpt. Veterans Affairs Office, Queen Mary Rd. $1,250,000. Plans deposit $350. Barott, Marshall, Merrett & Barott, 1425 Mountain St., archts. CD 2/18.

HEAVY CONSTRUCTION—LB & CA

▲ **Emil Anderson Constr. Co., Ltd.**, 4482 Main St., Vancouver, B. C. and **Square M Constr. Co.** and **Coleman Collieries, Ltd.**, 10325 61st Ave., Edmonton, Alta., CA $3,565,000, earth embankment, forming Waterton Dam, Waterton River 3½ mi. northeast of Hillspring, ALBERTA, Prairie Farm Rehabilitation, Admin., Motherwell Bldg., Regina, Sask. Bids Oct. 6. CD 10/21, under Lb.

BUILDINGS—LB & CA

Burns & Dutton Concrete & Constr. Co., Ltd., P. O. Box 636, Edmonton, Alta., CA Est. $750,000, V-shaped, concrete pillars MOTEL, EDMONTON, ALTA. Green Brier Motel, 10209 100th Ave., Edmonton, Alta. Annett & Bittorf, 702-10621 100th Ave., Edmonton, Alta., archts.

▲ **W. H. Copper Constr. Co., Ltd.**, 21 Hunter St. E., Hamilton, Ont., LB $1,053,673, (9 bidders), 1 and 2 story HIGH SCHOOL, BURLINGTON, ONT. Bd. Educ., Town of Burlington, Burlington, Ont. Bids Nov. 9. CD 10/17.

Inland Constr. Ltd., 546 Manitoba St. E. Moose Jaw, Sask. CA $797,800, 1 story, brick, steel WAREHOUSE, Park St. and 10th Ave., REGINA, SASK. Saskatchewan Liquor Bd., Parliament Bldgs., Regina, Sask. Stock, Keith & Assocs., 766 Angus St., Regina, Sask., archts. Awarded Nov. 9. CD 8/19.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Conn., Hartford**—Metropolitan Dist., 115 Broad St., Hartford, voted $1,250,000 bonds Nov. 8, water filter plant, north of Albany Ave. on Avon Mountain adjacent Reservoir 6 Intake House, Bloomfield, $1,000,000. CD 9/23.

▲ **Minn., Richfield (Minneapolis P.O.)**—Village, voted bonds Nov. 8, municipal water sys. $8,500,000. Orr-Schelen, Inc., 1104 Currie Ave., Minneapolis, engr. CD 10/5.

▲ **O., Oregon**—City, City Hall, voted $3,500,000 bonds Nov. 8, 4 mgd. cap. water system, intake from Reno Beach 5 mi. to Lake Erie, $5,000,000. CD 7/7.

▲ **Va., Arlington**—Arlington Co., Courthouse, voted $2,172,000 bonds Nov. 8, water sys. addn. CD 11/7.

SEWERS, WASTE DISPOSAL

▲ **Calif., San Diego**—City, City Hall, voted $42,500,000 bonds Nov. 8, 15 mi. intercepter line from Imperial Beach to Point Loma, $24,200,000; sewage treatment plant, Point Loma, $7,451,000; 2.5 mi. ocean outfall 250 ft. deep, $5,920,000; pumping stations, $6,339,000; sludge disposal line in Mission Bay, $340,000. CD 10/28.

▲ **Calif., San Francisco**—City, City Hall, voted $12,500,000 bonds sewers. CD 7/1/54.

▲ **Colo., Pueblo**—City, City Hall, storm sewer facilities in southwest part of city, $2,682,000. Ken R. White & Assocs., 1567 Marion St., Denver, consult. engrs. CD 9/30.

▲ **Mich., Riverview**—City, City Hall, defeated bonds Nov. 8, sewers, incl. treatment plant. $2,000,000. CD 10/26.

▲ **Mo., Kansas City**—City, City Hall, voted $75,000,000 bonds Nov. 8, sewage treatment plant to clean up Missouri River, sewer mains in new areas of city. CD 9/29.

▲ **Neb., Omaha**—City, City Hall, voted $10,700,000 bonds Nov. 8, sewage treatment plant. Henningson, Durham & Richardson, 2962 Harney St., Omaha, Neb., consult. engrs. CD 9/7.

▲ **O., Canton**—Bd. Comrs. Stark Co., Courthouse, sewer facilities, near Navarre Village. $1,300,000. Floyd G. Browne & Assocs., 125 W. Church St., Marion, consult. engrs. CD 10/27.

▲ **O., Cincinnati**—Bd. Comrs. Hamilton Co., Courthouse, voted $3,500,000 bonds Nov. 8, sewer imprvs. CD 11/4.

▲ **O., Columbus**—City, City Hall, voted bonds Nov. 8, sewers, $9,580,000. CD 8/1/60.

▲ **O., Elyria**—City, City Hall, defeated bonds Nov. 8, sewage expansion, $3,100,000. CD 6/23.

▲ **O., Mason**—Village, Village Hall, defeated $1,600,000 bonds Nov. 8, sewage disposal plant, sanitary sewerage system.

▲ **O., Strongville**—City, City Hall, defeated bonds Nov. 8, sewers, $2,630,000. CD 8/18.

▲ **O., University Heights**—City, City Hall, voted bonds Nov. 8, sewers in 4 of city's 6 sewer districts. $3,500,000. CD 7/8.

▲ **Tex., Fort Worth**—City, City Hall, bond election Dec. 13 postponed till Jan. 24, sanitary sewer extensions, impvs., $19,000,000; storm drains, $3,000,000. CD 11/4.

▲ **Tex., Victoria**—City, City Hall, defeated bonds Nov. 8, storm drainage. $1,300,000. CD 10/26.

▲ **Wash., Bellevue**—Eastgate Sewer Dist., sanitary sewer facilities, Eastgate-Factoria Area. $4,000,000. CD 11/12/58.

BRIDGES

▲ **N. C., Greensboro**—City, City Hall, voted $7,500,000 bonds Nov. 8, incl. bridges and culverts. $500,000. CD 11/10.

▲ **O., Cleveland**—Bd. Comrs. Cuyahoga Co., 1219 Ontario St., Zone 14, voted bonds Nov. 8 bridges, extending rapid transit to airport. $5,000,000. CD 7/13.

▲ **O., Columbus**—City, City Hall, voted $6,900,000 bonds Nov. 8, elimination of railroad grade crossings. CD 11/2.

▲ **Wash., Bellingham**—Whatcom Co., County Courthouse, defeated bonds Nov. 8, bridge from Lummi Point to Gooseberry Point. $1,750,000. H. M. Hadley, Securities Bldg., Seattle, Zone 1, consult. engr. CD 9/16.

STREETS AND ROADS

▲ **Iowa, Des Moines**—City, City Hall, South II, paving project, $1,500,000; East III paving Proj., $1,500,000. Art Grimm, City Hall, staff engr.

▲ **Md., Baltimore**—City, City Hall, approved Nov. 8, $6,000,000 loan for roads. CD 12/27/44.

▲ **N. C., Greensboro**—City, City Hall, voted $7,500,000 bonds Nov. 8, incl. imprv. Fisher Ave., from Elm to Summit Sts., incl. overpass, $765,000; Wendover Ave. imprvs., $370,000; Gaston St. imprvs., from Forbis to Perry Sts., incl. railway underpass, $625,000; relocating Battleground Ave., $290,000; Church St. imprvs., from fire training center to 14th St., $155,000. CD 10/18.

(Continued on page 91)

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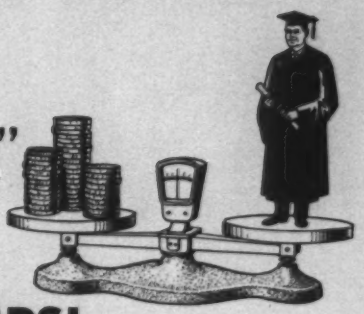

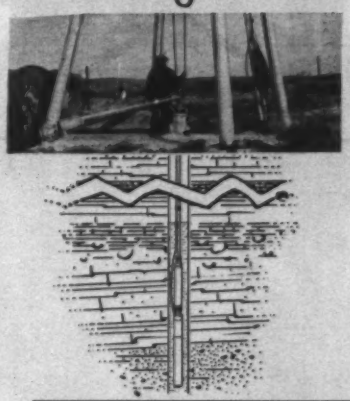

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		230 V 1 ph.	220 V 3 ph.	440 V 3 ph.	Minimum	Maximum	Maximum	Minimum
F-30AE	6"	5-7½	5-15	5-20	24	43	1600	220
D-33E	6"	5-10	5-20	5-40	28	56	2400	180
D-47E	6"	5-10	5-20	5-40	34	72	2000	140
G-70E	6"	5-10	5-20	5-40	42	100	1800	100
G-120	6"	5-10	5-30	5-40	93	158	1100	60
G-160	6"	5-10	5-30	5-40	86	186	900	60
I-200	8"	7½	7½-30	7½-40	80	272	800	80
FR-300	8"	7½	7½-40	7½-40	137	425	400	40
J-400	8"		15-40	15-40	265	625	240	40

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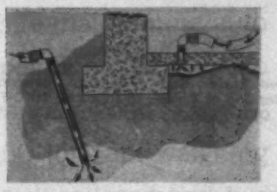

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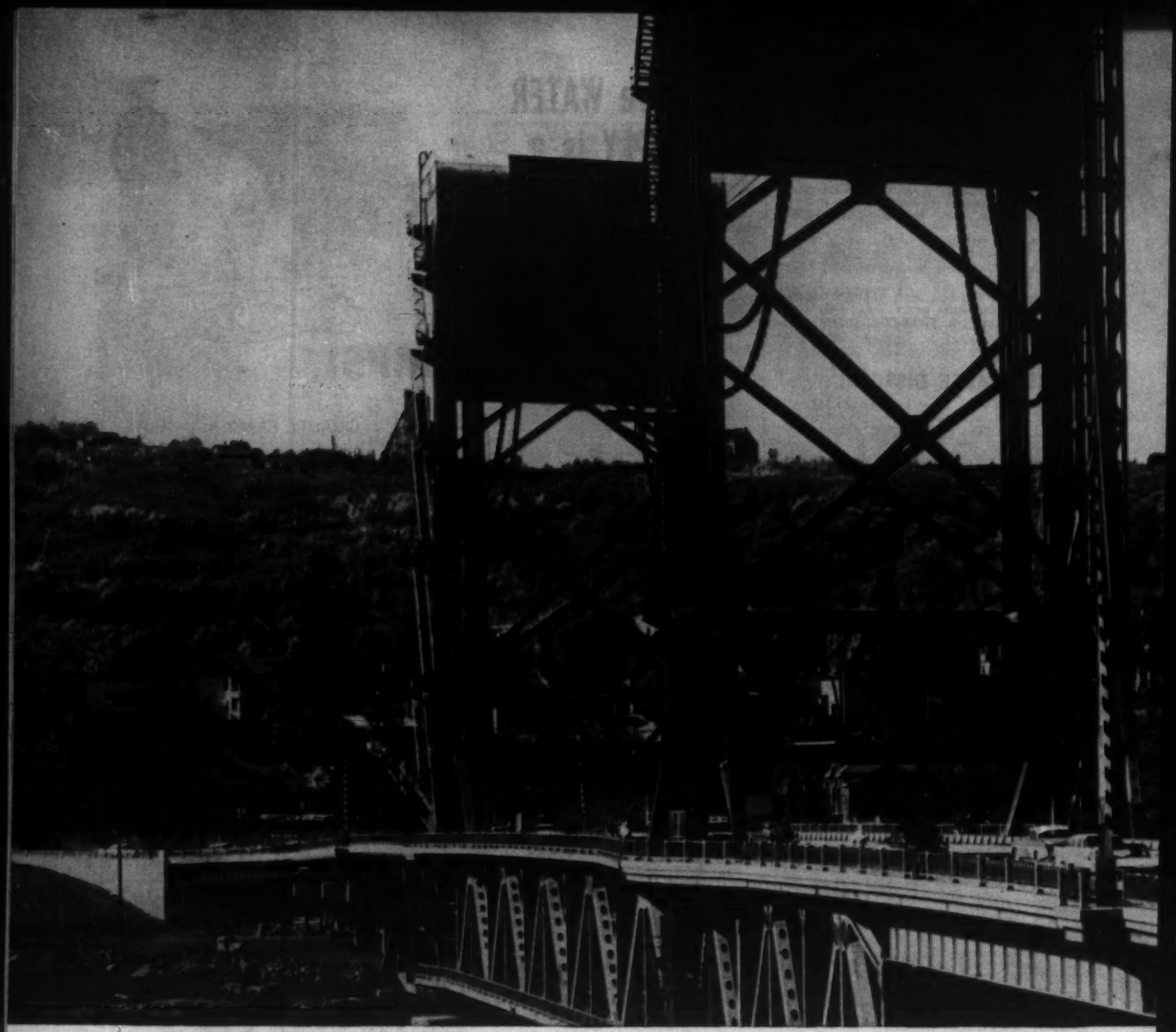

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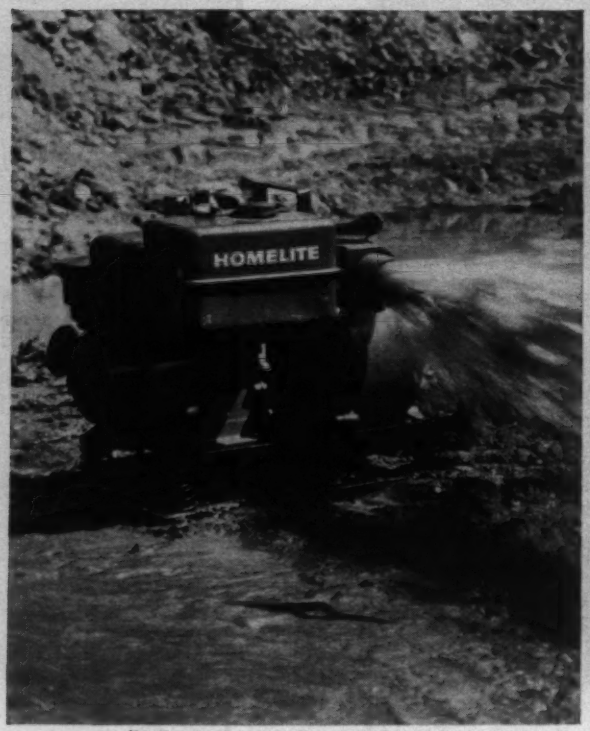

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(Continued from page 87)

▲ O., Cincinnati—Bd. Comrs. Hamilton Co., Courthouse voted $14,000,000 bonds Nov. 8, various road imprvs. CD 11/2.

▲ O., Cleveland—Comrs. Cuyahoga Co., Courthouse, voted bonds Nov. 8, roads. $5,000,000. CD 11/11/58.

▲ Tex., Fort Worth—City, City Hall, bond election Dec. 13 postponed till Jan. 24, assessment paving various streets. $5,200,000; Weatherford E. Belknap overpass, $3,950,000. CD 11/7.

▲ Tex., Sherman—City, City Hall, voted bonds Nov. 8, paving streets. $1,750,000. CD 10/24.

▲ Tex., Victoria—City, City Hall, defeated bonds Nov. 8, street paving. $2,700,000. CD 10/26.

EARTHWORK, WATERWAYS

▲ Hawaii, Kualapuu — Bd. Water Supply, 630 South Beretania St., Honolulu, Molokai Irrigation Project. $3,956,300.

▲ O., Columbus—City, City Hall, voted bonds Nov. 8, flood control, $3,250,000. CD 10/24.

▲ Wash., Bellingham—Port of Bellingham, Dock Waterway, defeated $1,650,000 bonds Nov. 8, filling 95 acre section of tidelands for use as industrial sites. CD 10/25.

AIRPORTS

▲† Neb., Fort Crook—HOUSING—Base Procurement Office, Offutt Air Force Base, Fort Crook, Neb., plans by Henningson, Durham & Richardson, Steele, Sandhorn & Weinstein, 252 Aquilla Court, Omaha, 500 units Capehart Housing, Unit 4. $8,250,000.

▲ N. Y., Idlewild—AIRPORT IMPRVS.—Port of New York Auth., 111 8 Ave., New York, Zone 11, 2nd unit heating and refrigerating plant, New York International Airport, $4,881,000; jetways (passenger loading bridges), Air France and British Overseas Airways Corp., $700,000; 36x200 ft. and 48x120 ft. addns. baggage handling facilities, $580,000; 2,000 ft. metal louver blast fences, $223,600.

▲ Pa., Oakdale—RADAR TOWERS—U. S. Eng., 925 New Federal Bldg., Pittsburgh, two radar towers, Oakdale Site, (Conad). $1,370,000 funds released. CD 7/2/59.

▲† S. C., Charleston—HOUSING—Dist. P. Wks. Office, 6th Naval Dist., 500 units Capehart Housing, Naval Air Station, $8,250,000.

UNCLASSIFIED

▲ Calif., Santa Rosa—HARBOR DEVELOPMENT—Bd. Supervs. Sonoma County, County Admin. Center, Santa Rosa, defeated $2,000,000 bonds Nov. 8, Bodega Harbor development. CD 9/29.

▲ Ohio—MICROWAVE TOWERS—Ohio Bell Telephone Co., 750 Huron Rd., Cleveland, Zone 15, microwave towers, between Cleveland and Ashtabula to improve long distance service. $2,000,000.

▲ O., Cleveland — PORT DEVELOPMENT — City, City Hall, voted bonds Nov. 8, port development. $3,000,000. CD 6/13.

▲ O., Cleveland — ZOO — Bd. Comrs. Cuyahoga Co., County Admin. Bldg., 1219 Ontario St., Zone 13, defeated bonds Nov. 8, zoo imprvs. $2,500,000. CD 8/1/60.

▲ O., Columbus—RECREATION—City, City Hall, voted bonds Nov. 8, recreation, $5,278,000. CD 8/1.

▲ Ore., Portland — DOCK IMPROVEMENTS — Portland Dock Comn., 3070 N.W. Front Ave., voted bonds Nov. 8, dock imprvs., seven year program. $9,500,000. CD 7/15.

▲ Tex., El Paso—STADIUM—El Paso County, Comrs. and County Judge, Courthouse, voted bonds Nov. 8, stadium for use of Texas Western College and Ysleta Schools. $1,750,000. CD 10/14.

▲ Tex., Fort Worth—TRAFFIC SIGNALS—City, City Hall, bond election Dec. 13 postponed till Jan. 24, traffic signals and street lights, $1,500,000. CD 11/7.

▲ Wash., Seattle — SPORTS STADIUM — King Co., County-City Bldg., defeated bonds Nov. 8, professional sports stadium. $15,000,000. CD 9/26.

▲ Wash., Seattle—CONTAINERSHIP TERMINAL—Port of Seattle, Bell St. Terminal, voted bonds Nov. 8, containership terminal at West Waterbury (Ames) terminal, $6,500,000; rebuilding Pier 28, $3,500,000; third transit shed East Waterway terminal, $850,000; improving Hanford St. grain terminal, $500,000. CD 10/4.

▲ Wash., Seattle—TERMINAL—Port of Seattle, Bell St. Terminal, Zone 1, voted bonds Nov. 8, convert Ames terminal into modern ocean terminal, incl. 1 story, 500,000 sq. ft. salmon terminal. $10,000,000. CD 6/1.

PUBLIC BUILDINGS

▲† Ala., Fort Rucker—HOUSING—U. S. Eng., 2301 Grant St., Mobile, plans by Pearson, Tittle & Narrows, 1st National Bank Bldg., Montgomery, 498 unit Capehart Housing. $8,217,000. CD 7/26.

▲† Ariz., Fort Huachuca—HOUSING—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., plans by John Brenner-McIntire, Arnold, 97 W. Lynwood, Phoenix, No. 3 unit Capehart Housing, $1,650,000.

▲ Ark., Magnolia—HOSPITAL—Columbia County, Courthouse, defeated bonds Nov. 8, county hospital. $1,950,000. CD 10/25.

▲ Calif., Antioch—SCHOOL—Antioch Unif. School Dist., 20 and A Sts., voted $4,831,000 bonds, school. CD 9/18.

▲† Calif., Beale Air Force Base—HOUSING—Base Procurement Office, Beale Air Force Base, Calif., plans by Clair A. Hill & Assoc., 1916 8 St., Redding, 230 units Capehart Housing, Unit 3. $3,795,000. CD 5/9.

▲† Calif., Ford Ord—HOUSING—U. S. Eng., 180 New Montgomery St., San Francisco, plans by Angus McSweeney, Inc., 2960 Van Ness Ave., San Francisco, 500 units Capehart Housing, Unit 4. $8,250,000. CD 9/8/58.

▲ Calif., Los Angeles—MUSIC CENTER, etc.—Los Angeles Co., 300 W. Temple St., plans by Welton Becket & Assoc., 10000 Santa Monica Blvd., 5 story, rein.-con. music center and 4 level underground garage, Civic Center. $15,000,000. Constr. 1962.

▲† Calif., Oakland—MECHANIZED MAIL FACILITIES—Contracting Officer, U. S. Post Office Dpt., Pennsylvania Ave. between 12 and 13 Sts. N.W., Wash., D. C., plans by Stone, Marraccini & Patterson, 536 Mission, San Francisco, mechanized mail facilities, near 7 St. $12,000,000. John A. Blume & Assoc., 612 Howard St., San Francisco, consult. engrs.

▲ Calif., Pasadena—JUNIOR COLLEGE, etc.—Pasadena City School Dist., 351 S. Hudson Ave., defeated bonds Nov. 8, Junior College and high school. $13,500,000. CD 9/29.

▲† Calif., Point Mugu—HOUSING—Dist. P. Wks. Office, 11th Naval Dist., 1220 Pacific Hy., San Diego, Zone 1, 200 unit Capehart Housing, Naval Missile Facility, Point Arguello. $3,300,000.

▲ Calif., San Mateo—JUNIOR COLLEGE—San Mateo Junior College Dist., Coyote Point Campus, San Mateo, plans by John Carl Warnecke & Assoc., 111 New Montgomery St., San Francisco, Calif., 460,000 sq. ft. San Mateo Junior College, Incl. College Heights Campus on Parrot Dr.; administration; student center; cultural center academic group science; engineering group; technical group; vocational group; horticulture center; library; gymnasimum; maintenance center; historical museum. $10,000,000, John A. Blume & Assoc., 612 Howard St., San Francisco, consult. engrs. Bids in December. CD 7/15.

▲ Calif., Santa Rosa—HALL OF JUSTICE—Sonoma Co., County Admin. Center, defeated $3,085,000 bonds Nov. 8, Hall of Justice. CD 9/28.

▲ Conn., Wethersfield — SCHOOL — Town, Town Hall, voted $1,580,000 bonds Nov. 8, Junior High School, Wells Rd. $1,400,000. Jeter & Cook, 36 Pearl St., Hartford, archts. CD 10/17.

▲ Fla., Clearwater—SCHOOLS—Pinellas Co. Bd. Pub. Instruction, voted $6,000,000 bonds, schools. CD 6/15.

▲ Fla., Ft. Myers—SCHOOL—Lee County, Courthouse, Fort Myers, voted bonds Nov. 8, school, $2,650,000.

▲† Fla., Mayport—HOUSING—Dist. P. Wks. Office, 6th Naval Dist., Charleston, S. C., plans by Joseph H. Bryson, 301-06 Greenleaf Annex, Jacksonville, 500 units Capehart Housing. $8,250,000.

▲ Fla., Tampa—SCHOOLS—Hillsborough Co., County Bldg., voted $12,000,000 bonds, Nov. 8, for schools incl:
Senior High School, Northern Hillsborough County, $1,464,000.
Junior High School, Bearss Ave. and Northern Blvd., $571,800.
Clair-Mel City School, $571,800.
Sulphur Springs School, $571,800.
Temple Terrace School, $571,800.
Seffner School, $409,700.
Manhattan and Sligh Aves. School, $453,320.
Lake Magdalene School, $453,320. CD 8/18.

▲† Ga., Albany — HOUSING — Base Procurement Office, Turner Air Force Base, Albany, 430 units Unit 2 Capehart Housing. $7,095,000. James C. Wise, 873 Spring St. N.W., Atlanta, archt. CD 9/15.

▲ Ga., Cedar Springs — PAPER MILL — Early County, Blakely, Ga., voted $50,000,000 bonds Nov. 8, paper mill. Southern Land, Timber & Pulp Corp., 795 Peachtree St. N.E., Atlanta, lessee. J. E. Sirrine & Co., 215 S. Main St., Greenville, S. C., consult. engrs. CD 10/20.

▲ Hawaii, Honolulu—STATE CAPITOL—State of Hawaii, 465 South King St., plans by Belt, Lemmon & Lo, and John Carl Warnecke, Hawaiian Life Bldg., 1410 Kapiolani Blvd., State Capitol Bldg. $14,500,000. CD 8/19/59.

▲ Ill., Alton — HOSPITAL — State of Illinois, Capitol Bldg., Springfield, state hospital bldgs. and remodeling, $8,268,317 (funds available from bonds voted Nov. 8).

▲ Ill., Anna — HOSPITAL — State of Illinois, Capitol Bldgs., Springfield, state hospital bldgs., $5,581,744 (funds available from bonds voted Nov. 8).

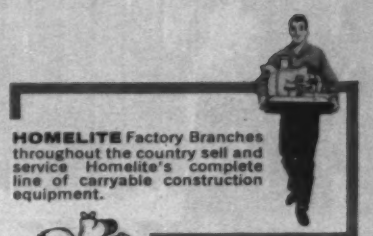
▲ Ill., Chicago—CHRONIC DISEASES HOSPITAL—State of Illinois, Capitol Bldg., Springfield, Neuro-psychiatric chronic diseases hospital, $16,474,000 (funds available from bonds voted Nov. 8).

▲ Ill., Chicago—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, hospital modernization, State Hospital, $3,408,491 (funds available from bonds voted Nov. 8).

▲ Ill., Chicago—INFIRMARY—State of Illinois, Capitol Bldg., Springfield, Illinois Eye and Ear Infirmary, $4,000,000 (funds available from bonds voted Nov. 8).

▲ Ill., Collinsville — SCHOOL — Collinsville Community Unit School Dist., Bd. Educ., $1,500,000 bond elec-

(Continued on page 94)



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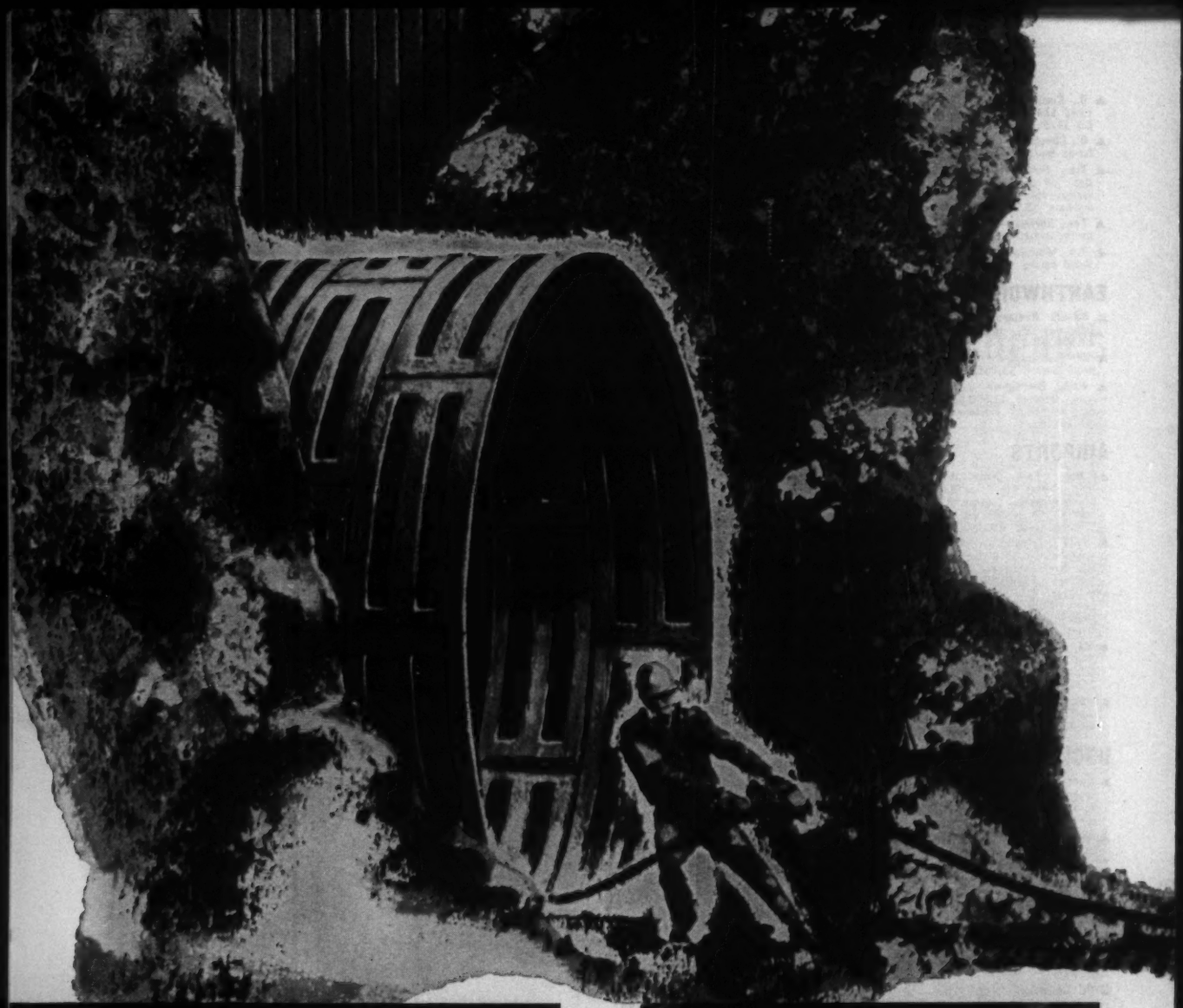

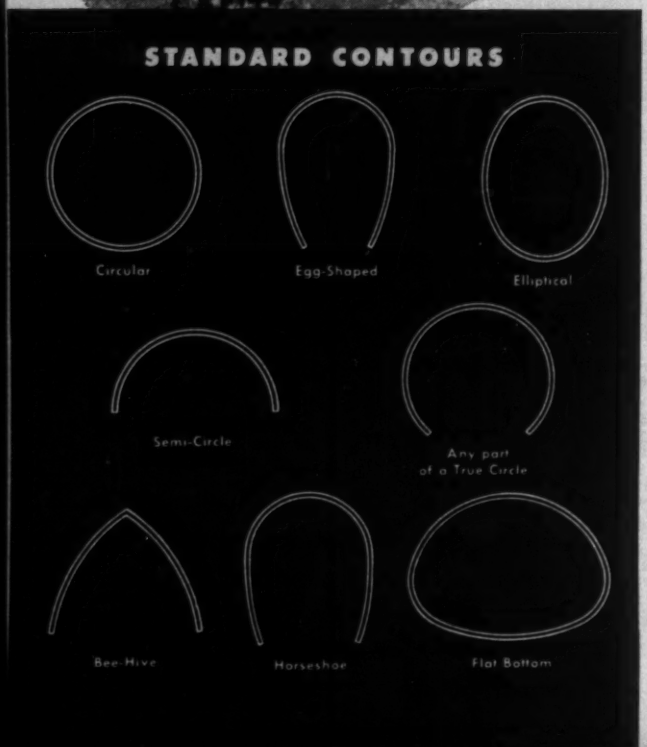

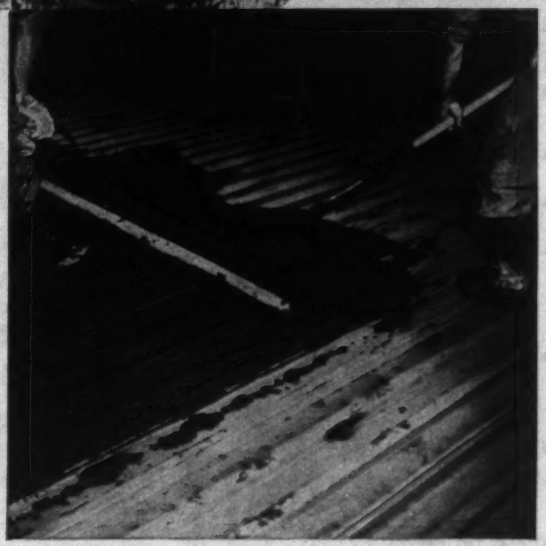

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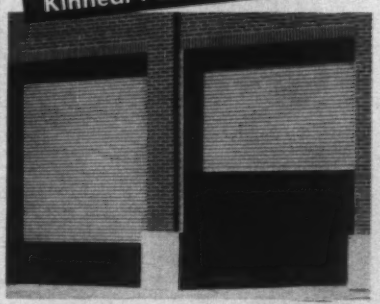

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(Continued from page 91)

tion Dec. 10, Junior High School, $1,286,000. Bids in Spring. CD 10/3.

▲ **Ill., Dixon** — HOSPITAL — State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $10,367,730 (funds available from bonds voted Nov. 8).

▲ **Ill., East Moline** — HOSPITAL — State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $8,443,761 (funds available from bonds voted Nov. 8).

▲ **Ill., Elgin** — HOSPITAL — State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $10,415,670 (funds available from bonds voted Nov. 8).

▲ **Ill., Galesburg**—RESEARCH HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state research hospital, $4,268,310 (funds available from bonds voted Nov. 8).

▲ **Ill., Jacksonville**—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $10,566,933 (funds available from bonds voted Nov. 8).

▲ **Ill., Jacksonville**—SCHOOL FOR DEAF—State of Illinois, Capitol Bldg., Illinois School for the Deaf, $1,533,103 (funds available from bonds voted Nov. 8).

▲ **Ill., Kankakee**—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $6,401,641 (funds available from bonds voted Nov. 8).

▲ **Ill., Lincoln**—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, Illinois Children's Hospital, $2,970,000 (funds available from bonds voted Nov. 8).

▲ **Ill., Lincoln** — SCHOOL — State of Illinois, Capitol Bldg., Springfield, state school bldgs., $13,477,719 (funds available from bonds voted Nov. 8).

Ill., Manteno—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $10,843,306 (funds available from bonds voted Nov. 8).

▲ **Ill., Peoria**—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state hospital bldgs., $5,740,239 (funds available from bonds voted Nov 8).

▲ **Ill., Quincy**—SOLDIERS AND SAILORS HOME—State of Illinois, Capitol Bldg., Springfield, Soldiers and Sailors Home, $5,400,000 (funds available from bonds voted Nov. 8).

▲ **Ill., Tinley Park**—HOSPITAL—State of Illinois, Capitol Bldg., Springfield, state hospital, $18,389,499 (funds available from bonds voted Nov. 8).

▲ **Ind., Crawfordsville**—POWER PLANT—City, Bd. P. Wks. & Safety, City Hall, power plant, installing 12,650-watt generator, $3,500,000.

▲† **Ky., Fort Campbell**—HOUSING—U. S. Eng., 7th Ave. and Broadway, Nashville, Tenn., plans by Taylor & Crabtree, 1812 Broadway, Nashville, Tenn., 400 unit Capehart Housing, Unit 2. $6,600,000. CD 8/1.

▲ **Ky., Murray**—HOSPITAL—City and Calloway Co. Hospital, voted bonds, 100-bed city and county hospital. $1,500,000.

▲ **La., Chalmette**—SCHOOLS—St. Bernard Parish School Bd., voted $3,000,000 bonds, schools.

▲† **Md., Fort George G. Meade**—HOUSING—U. S. Eng., 24 St. and Maryland Ave., Baltimore, 400 unit Capehart Housing, Unit 2. $6,600,000. CD 7/26.

▲ **Mass., Holyoke** — HOUSING — City Housing Auth., Admin. Bldg., Jackson Parkway, plans by William Hoskins Brown, 344 Boylston St., Boston, PHA Mass. 5-5 Housing Proj., 7 story each, 150 units at 3 sites. $1,500,000. CD 5/6/59.

▲ **Mass., Lynnfield**—SENIOR HIGH SCHOOL—Town, High School, Lynnfield, Senior High School. $1,500,000. Constr. 1961.

▲ **Mich., Ann Arbor**—CITY HALL—City, voted $2,275,000 bonds Nov. 8, city hall. CD 10/3.

▲ **Mich., Dearborn** — CIVIC AUDITORIUM — City, City Hall, defeated $3,975,000 bonds Nov. 8, civic auditorium. CD 10/19.

▲ **Mo., Columbia**—POWER PLANT ADDN.—City, City Hall, defeated $4,800,000 bonds Nov. 8, municipal water and electric, power plant addn. CD 8/25.

▲ **Mo., Columbia**—MEMORIAL STUDYING UNION, etc. —Curators University of Missouri, 116 Jesse Hall, 2 story, 33,000 sq. ft. south wing Memorial Studying Union, and 2 story 57,300 sq. ft. Student Union Annex, Rollins St. and The Mall. $2,605,000. Constr. early part 1961.

▲ **Mo., Columbia**—NUCLEAR RESEARCH REACTOR, etc. —University of Missouri, 116 Jesse Hall, plans by C. L. T. Gabler & Assocs., 3300 Book Bldg., Detroit 26, Mich., nuclear research reactor, laboratory, office and cooling tower bldgs. $1,875,000.

▲ **Mo., St. Louis**—SCHOOLS—Bd. Educ., 911 Locust St., Zone 1, defeated $29,535,000 bonds Nov. 8, schools. CD 9/27.

▲ **Neb., Omaha** — HOSPITAL ADDN. — Douglas Co., Courthouse, 17 and Farnam, defeated $2,500,000 bonds Nov. 8, county hospital addn. CD 9/19.

▲ **N. J., Eatontown**—SCHOOL—Bd. Educ., Grant Ave., referendum bonds and project Dec. 6, elementary school, Wyckoff Rd. $1,700,000. Licht & Johnson, 19 Knickerbocker Rd., Englewood, archt. CD 10/19.

▲ **N. J., Manahawkin**—HIGH SCHOOL—Bd. Educ. Stafford Twp., New York Rd., plans by F. Herbert Radey, 8th and Market Sts., Camden, Junior High School, Stafford Twp. $1,500,000. Former project abandoned, Sherman Taylor & Sleeper, 501 Cooper St., Camden, N. J., consult engrs. CD 9/30.

▲ **N. Y., Yonkers**—HOUSING—Yonkers Municipal Housing Auth., Bldg. 8, Schlobohm Houses, plans by R. S. Krinsky & Assocs., 20 S. Broadway, low rent housing to incl. one 6 story and two 13 story, 279 units, School and Brook Sts. $3,000,000. Jaros, Baum, &

(Continued on page 97)

DIG TRENCH AND BELLHOLES IN SINGLE PASS

The Cleveland JS-30 Trencher digs bellholes at pipe joints, digs flush to obstructions, slopes as it digs.

Note the ample-width bellhole in the foreground above. The JS-30's exclusive power-shifted digging wheel shifts 2½ feet to each side of center to dig bellholes like this and to keep trench in line even when crawlers are being steered around side obstructions.

The JS-30's wheel power-*tilts*, too—saves blocking and cribbing when either crawler track is higher than the other on curbs, side slopes, etc.

Note, too, how the JS-30's power-shifted V conveyor with operator-controlled speeds up to 1,000′ per minute—another Cleveland exclusive—easily handled the big spoil volume from the wide-sloped trench. The JS-30 sloped the trench to 6′ top width as it dug.

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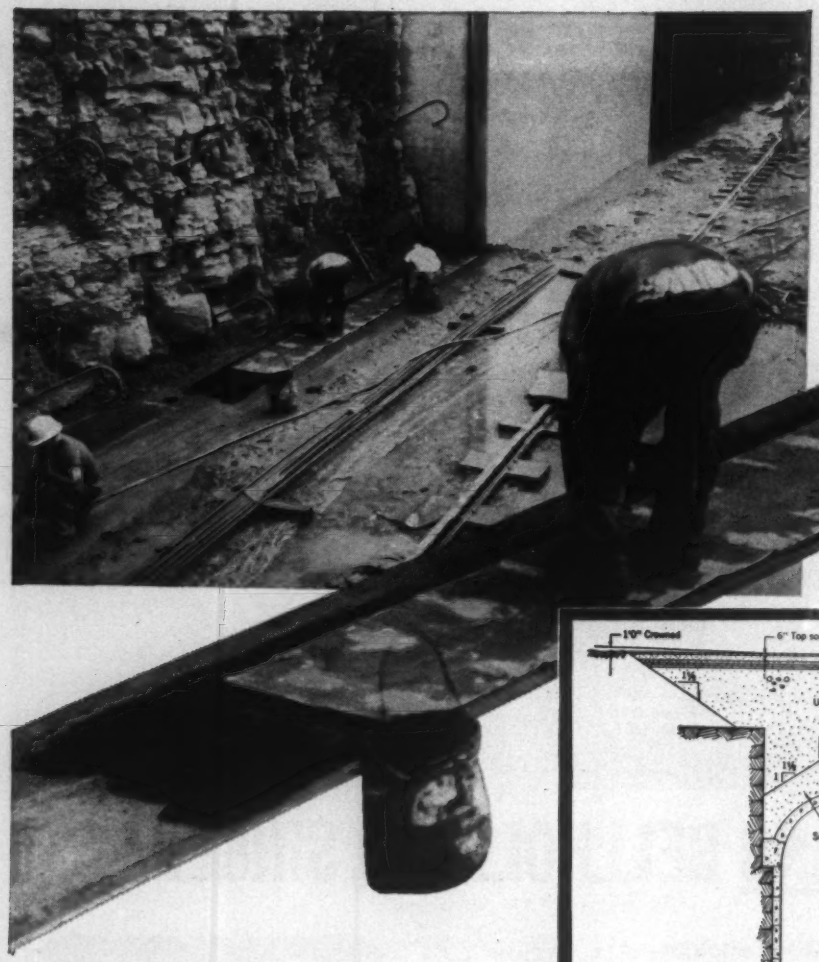
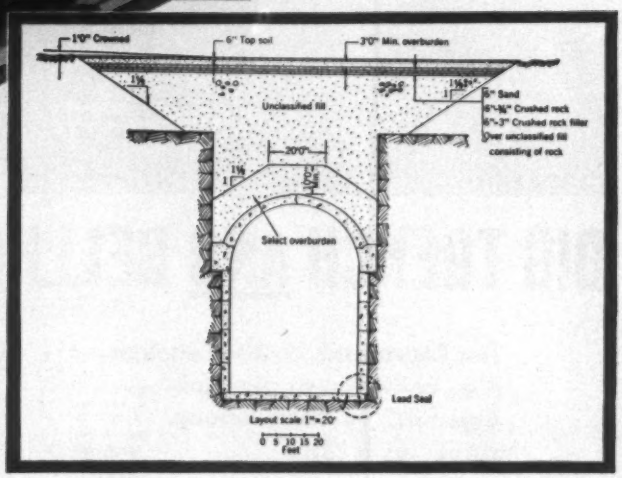


Concrete conduits for giant Niagara Power Project call for over 350 tons of sheet lead.



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LOOK AHEAD WITH LEAD

(Continued from page 94)

Bolles, 415 Lexington Ave., New York 17, N. Y., mechanical engrs. Bids February 1961.

▲ **N. D., Bowman**—PLANT—City, City Hall, uranium processing plant, $3,000,000. Atomic Energy Comn., Grand Junction, Colo., approved project.

▲ **O., Alliance**—HOSPITAL—City, City Hall, defeated bonds Nov. 8, Alliance City Hospital Addn. $1,500,000. CD 7/28.

▲ **O., Ashtabula**—CITY HALL—City, City Hall, defeated bonds Nov. 8, city hall, $1,450,000. George Anderson, 4634 Main St., archt. CD 8/10.

▲ **O., Bedford**—SCHOOLS—Bedford Bd. Educ., 91 Tarbell St., voted bonds Nov. 8, schools, $1,800,000. CD 6/22.

▲ **O., Bellvue**—SCHOOLS—Bd. Educ., defeated bonds, Nov. 8, schools, $1,340,000. CD 7/18.

▲ **O., Blue Ash (Br. Cincinnati)**—SCHOOL—Sycamore Local School Dist., 6600 Cornell Rd., voted $1,300,000 bonds Nov. 8, Junior High School. CD 10/17.

▲ **O., Brewster**—HIGH SCHOOL—Fairless Bd. Educ., defeated bonds Nov. 8, high school, $1,600,000. CD 9/21.

▲ **O., Cincinnati**—HOSPITAL—City, City Hall, did not vote bonds Nov. 17, general hospital, $17,000,000. (Correction—status). CD 11/15.

▲ **O., Cleveland**—SCHOOLS—Bd. Educ., 1380 E. 6th St. Zone 14, voted 2 mill levy, Nov. 8, schools, $22,000,000. CD 8/5.

▲ **O., Cleveland**—UNDERGROUND EXPOSITION HALL—City, City Hall, Zone 14, voted bonds Nov. 8, underground exposition hall under mall, $10,000,000. CD 6/17.

▲ **O., Dover**—SCHOOLS—Bd. Educ., voted bonds Nov. 8, schools, incl. high school, $1,876,400. CD 10/17.

▲ **O., Elgin**—SCHOOL—Bd. Educ. plans by Sullivan Isaacs & Sullivan, 1800 Reading Rd., Reading, high school. $1,300,000. Bids in Summer.

▲ **O., Findlay**—HIGH SCHOOL—Bd. Educ., voted bonds Nov. 8, high school. $4,800,000. CD 9/7.

▲ **O., Indian Hill**—SCHOOL—Indian Hill Exempted School Dist., Drake Rd., voted $1,925,000, bonds Nov. 8, elementary and high schools. Woodie Garber & Assocs., William Howard Taft Rd., Cincinnati, archts. CD 5/11.

▲ **O., Ketterling**—SCHOOLS—Ketterling Bd. Educ., voted bonds Nov. 8, schools $4,950,000. CD 6/23.

▲ **O., Mansfield**—SCHOOLS—Madison Local School Dist., voted bonds Nov. 8, schools, $1,700,000. CD 10/19.

▲ **O., Maple Heights**—SCHOOLS—Bd. Educ., 550 Clement Dr., voted bonds Nov. 8, Junior High School, high school and Rockside Elementary School addn., $2,921,000. CD 7/20.

▲ **O., Mount Healthy**—SCHOOL—Bd. Educ., 1738 Compton Rd., voted $315,000 bonds Nov. 8, high school, Adams Rd., $1,295,000. CD 7/20.

▲ **O., Parma**—SCHOOLS—Bd. Educ., 5401 W. 54th St., Cleveland, Zone 29, voted bonds Nov. 8, schools, $3,000,000. CD 8/18.

▲ **O., Shaker Heights**—SCHOOLS—Bd. Educ., 3115 Woodbury Rd., Cleveland, Zone 20, voted $1,775,000, bonds, Nov. 8, schools. CD 6/22.

▲ **O., Upper Sandusky**—SCHOOLS—Bd. Educ., voted bonds Nov. 8, schools, $1,750,000. CD 8/10.

▲ **O., Van Wert**—SCHOOLS—Van Wert Bd. Educ., voted bonds Nov. 8, schools, $1,920,000. CD 7/27.

▲ **O., Xenia**—HIGH SCHOOL—Xenia Bd. Educ., voted bonds Nov. 8, Junior High School, $1,300,000. CD 7/20.

▲† **Okla., Fort Sill**—CAPEHART HOUSING—U. S. Eng., 616 S. Boston Ave., Tulsa, plans by Alexander, Dunway & Jones & Johnson, Fell & Wheeler, 2712 Danville Ave., Houston, Tex., 350 unit Capehart Housing No. 2, $5,775,000. CD 7/26.

▲ **Pa., Boothwyn**—SCHOOL—Chichester Joint School Bd. plans by Vincent G. Kling, 917 Corinthian Ave., Phila, Senior High School, Chichester Rd. $2,500,000. Construction early February 1961. CD 5/27.

▲ **Pa., Hawley**—SCHOOL—Wallenpaupack Area Jt. School Dist., Proj. 899, Secondary School. $2,100,000.

▲† **Pa., Phila.**—HOUSING—Dist. P. Wks. Office, 4th Naval Dist., Bldg. 1, Naval Base, Phila., 400 units, Capehart Housing, Naval Station, $6,600,000. CD 7/22.

▲ **Pa., Plymouth Meeting**—SCHOOL ADDN.—Plymouth-Whitemarsh Joint School Dist. plans by Howell Lewis Shay & Assoc., Packard Bldg., Phila., Pa., Junior High School addn. $2,150,000. Bids February 1961. CD 6/17.

▲ **Tenn., Chattanooga**—SCHOOLS—Hamilton Co. Bd. Educ., Courthouse, voted $7,000,000 bonds, schools.

▲ **Tex., Arlington**—SCIENCE ADDN.—Arlington State College, Arlington, plans by Preston M. Geren, 1607 Fort Worth Natl. Bldg., Fort Worth, 3 story, 100,000 sq. ft. 7 basement, science addn., $1,800,000. CD 7/25.

▲ **Tex., El Paso**—AUDITORIUM-CIVIC CENTER—El Paso County, Courthouse, defeated bonds Nov. 8, auditorium and civic center, P-Tx-3091, $5,500,000. CD 10/24.

▲ **Tex., Hurst**—SCHOOL IMPRVS.—Ind. School Dist., Hurst-Euless-Bedford, voted bonds Nov. 8, school imprvs. incl. Junior High School in Euless area, 8 classroom addn. to 4 existing schools in area, on West Hurst, Shady Oaks, N. Euless and Belair Elem. Schools, $4,000,000. CD 10/17.

▲ **Tex., Irving**—STUDENT CENTER—University of Dallas, University Ave., plans by Adams & Adams, 701 Exchange Bank Bld., Dallas, 1 story, masonry, student center, CH-TX-1225, $1,275,000.

▲ **Wash., Aberdeen**—HIGH SCHOOL—School Dist. No. 5, 1001 Summit St., voted $1,000,000 bonds Nov. 8, high school, $1,500,000. CD 9/27.

▲ **Wash., Edmonds**—SCHOOLS—School Dist. No. 15, voted $1,500,000 bonds Nov. 8, four elementary schools, $2,000,000. CD 9/19.

▲† **Wash., Fort Lewis**—HOUSING—U. S. Eng., 1519 S. Alaskan Way, Seattle, plans by Jones, Lovegrew, Helms & Jones, Republic Bldg., Seattle, 500 unit Capehart Housing No. 3, $8,250,000. CD 7/26, under Unclassified.

▲ **Wash., Tacoma**—CIVIC AUDITORIUM—City, City Hall, defeated bonds Nov. 8, civic auditorium, $6,500,000. CD 9/1.

▲ **Wash., Tacoma**—SCHOOL—Clover Park School Dist., 5214 Steilacoom Blvd. S. W., voted special levy Nov. 8 to raise $490,000, high school, $2,825,000. CD 9/29.

▲ **Wash., Walla Walla**—HIGH SCHOOL—School Dist. 40, High School, plans by K. W. Brooks & Assocs., W. 707 5th St., Spokane, high school, $2,300,000. Bids next year. CD 11/12/59.

▲ **Wis., Elkhorn**—HOSPITAL—Walworth County plans by Elling, Plunkett & Keymar, 1220 N. Milwaukee St., Milwaukee, Zone 2, hospital, $2,008,700. Bids in March. CD 11/19/58.

▲ **B. C., Vancouver**—COLLEGE OF EDUCATION—University of British Columbia, campus, four unit college of education, University of British Columbia, $3,500,000.

▲ **Ont., Toronto**—HOUSING—Central Mortgage & Housing Corp., 650 Lawrence Ave. W, plans by Bregman & Hamann, 146 Bloor St. W., low rental apartment housing $2,000,000; plans by Harry B. Kohl, 491 Lawrence Ave. W., high-rise apartments, and senior citizens homes, Warden Ave., $1,000,000.

▲ **Ont., Toronto**—HOUSING—Municipality of Metropolitan Toronto, 67 Adelaide St. E., plans by James A. Murray, 440 Bayview Ave. and Henry Fliess, 224 Merton St., 1,500 unit low rental housing, south of Allison Rd., near Thistletown and No. 27 Hy. $15,000,000.

▲ **Que., Laval**—CITY HALL, etc.—City, c/o Jean N. Lavoie, N.P., 3582 Levesque Blvd., L'Abord a Plouffe, city hall, police and fire station. $1,500,000.

COMMERCIAL BUILDINGS

▲ **Calif., Hillsdale**—FASHION STORES—David D. Bohannan Organization, c/o Welton Beck & Assoc., archts., 153 Maiden Lane, San Francisco, 7 and 10 story fashion stores, Hillsdale Fashion Square, Hillsdale Shopping Center. $4,000,000.

▲ **Calif., Palo Alto**—APARTMENTS—Karl Wilson, 967 Oregon, plans by Stanley Mattson & Assocs., Designer, 638 San Antonio Rd., Mountain View, nine 2 story 180 units apartments and 9 duplexes. $1,500,000.

▲ **Iowa, Des Moines**—CLASSROOMS, etc.—Drake University, 24th and University Sts., Zone 11, plans by Harry Weese & Assocs, 104 S. Michigan St., Chicago 3, Ill., three classroom bldgs. $4,000,000, residential and dining facilities, union bldg., $3,200,000. CD 7/5/56.

▲ **La., New Orleans**—DORMITORY—Tulane University, 6823 St. Charles Ave., men's dormitory (CH-LA-32D). $2,300,000.

▲ **Mass., Roxbury**—APARTMENTS—Charles Bank Homes, Inc., c/o Ernest Henderson, 470 Atlantic Ave., Boston, plans by Hugh A. Stubbins Assoc., 806 Mass. Ave., Cambridge, housing apartments, Parker Hill Section. $8,000,000.

▲ **Minn., Roseville (St. Paul P. O.)**—OFFICE, etc.—Control Data Corp., 501 Park Ave., Minneapolis, plans by Community Planning & Design Assocs., 2635 University Ave., St. Paul, 1 story, 100,000 sq. ft. office and engineering laboratory, Hy. 36 and Fairview Ave. $1,500,000. J. T. Baker & Assoc. Engineers, 1835 University Ave., St. Paul, consult. engrs.

▲ **Neb., Omaha**—HOTEL, etc.—Airport Parking Co. of America, 1308 Cleveland, O., 10 story hotel, 400 car garage, swimming pool, 14th & Dodge Sts. $2,000,000.

▲ **N. Y., Harriman**—CURE'D'ARS SEMINARY—Catholic Archdiocese Bldg. Comn., 451 Madison Ave., New York, Zone 22, Cure'D'Ars Seminary. $5,000,000. (Correction—project location.) CD 9/20, under N. Y., Harrison.

▲ **N. Y., New York**—APARTMENT—200 Central Park South, Inc., 551 Fifth Ave., New York 17, plans by Wechsler & Schimenti, 118 East 25 St., New York 10, N. Y., apartment, 200-204 Central Park South. $4,000,000.. Irvine Kleinman, 30 Broadway, Massapequa, N. Y., mechanical engr. Greenhut & Taffel, 114 E. 32 St., New York 16, N. Y., structural engrs. CD 4/20.

▲ **O., Columbus**—CONVENT—Sisters of the Good Shepherd, 31 Sandusky St., plans by Emerick, Albert & McGee, 539 E. Town St., convent for emotionally disturbed girls, Mifflin Twp., $1,600,000. CD 5/2.

▲ **Okla., Tulsa**—OFFICE—Jack Kelley & Assocs., Mayo Hotel, plans by Kelley & Marshall, Mayo Bldg., 12 story office and club, Petroleum Club, 6th and Boulder Sts. $2,500,000, Bids about March.

▲ **Pa., Phila.**—APARTMENT—Owner, c/o Francis Jobson, archt., Gulph Rd., Wayne, 10 story apartment, basement garage. Over $1,000,000.

▲ **Pa., Pittsburgh**—CHILD PSYCHIATRY UNIT—University of Pittsburgh, 5th and Bigelow, child psychiatry unit and parking area, $2,000,000; reconstruct in-patient clinical service areas, $2,500,000, for Western Psychiatric Institute and Clinic. CD 9/15/58, under Public Buildings.

▲ **Tex., El Paso**—INFIRMARY—Sister of Loretto, Loretto Academy, 4600 Hueco St., 50 room infirmary, Home for Retired Sisters, $3,000,000.

▲ **Tex., Houston**—OFFICE—Bill Bennett, 1512 Pierce St., plans by Dean A. Eichelberger, No. 2 Chelsea St., 17 story, Saint Joseph Tower Office Professional. $3,500,000. Walter P. Moore, 2 Pinedale St., and Bernard Johnson & Associates, 4926 Travis St., staff engrs. CD 7/13.

▲ **Tex., Houston**—DWELLINGS—Pace Setter Homes, Inc., 6723 Glen Rock St., 380 dwellings, Barkley Square, north and south Bray's Bayou, $8,998,000.

▲ **Tex., Plano**—DWELLINGS—H. L. Hunt, 1739 Fordham St., Dallas, Tex., Phase 1, 153 dwellings, North Texas, community, 1,700 acre tract west of Central Expressway, $1,836,000.

▲ **Va., Princess Anne**—HOSPITAL—Princess Anne Co. Memorial Hospital, Princess Anne Plaza, 100 to 120 bed Princess Anne Co. Memorial Hospital. $1,500,000. CD 4/8.

▲ **Wash., Seattle**—OFFICE—Boeing Airplane Co., 7755 E. Marginal Way, 2 story, 250,000 sq. ft. office, Over $3,000,000.

▲ **Wash., Seattle**—LIBRARY, etc.—Seattle Pacific College, 3307 3rd Ave. W., plans by Durham, Anderson & Freed, 1100 Denny Way, library, $400,000; two dormitories to house 150 men and women, dining unit for 600 people, $1,300,000. Bids about June. CD 9/22.

▲ **Alta., Edmonton**—MOTEL—G. Roland, McLean, 10336 Villa Ave., motel, west of 101st St., near MacDonald Dr. $2,000,000.

▲ **Ont., London**—APARTMENT, etc.—Miller Constr. Co., 779 Little Simco St., 9 story, 130 x 200 ft., brick, steel apartment, swimming pool, two parking garages. $1,900,000. Constr. in Spring.

▲ **Ont., Toronto**—SHOPPING CENTRE—Eastown Shopping Centre Ltd., c/o Bruce Foster Ltd., 32A Prince Arthur Ave., shopping centre, north side Kingston Rd., between Centennial Rd. and Durnford. $6,000,000. Project Planning Associates Ltd., 40 Irwin Ave., consult engrs. Bids early 1961.

INDUSTRIAL BUILDINGS

▲ **Ala., Cherokee**—CHEMICAL PLANT, etc.—Armour & Co., 1425 W. 42nd St., Chicago, Ill., fertilizer and chemical mfg. plant. $30,000,000. Paxton & Alexander, 303 Raleigh Ave., Sheffield, consult. engrs. (Correction—cost). CD 11/10.

▲ **Calif., Sunnyvale**—ENGINEERING and LABORATORY—Lockheed Missiles & Space Div., Lockheed Aircraft Co., 745 Chrysler Bldg., New York 17, N. Y., 172,800 sq. ft. engineering and laboratory bldg. $4,000,000.

▲ **Mont., Anaconda**—PLANT—Strategic Materials Corp., c/o Webb & Knapp, Inc., 383 Madison Ave., New York, N. Y., steel plant. $20,000,000. Koppers Co., Kopper Bldg., Pittsburgh, Pa., consult. engr. Hammond-Everly Engineering Co., 826 W. Park St., Butte, Mont. will make site survey. CD 9/24/59.

▲ **N. Y., Rochester**—WAREHOUSE—3131 Winton Realty Corp., c/o Neisner Brothers, Inc., lessee, 49 East Ave., 180,000 sq. ft. steel and concrete warehouse. $2,000,000. To go ahead 1961.

▲ **Ont., Cooper Cliffs**—PLANT—International Nickel Co., Inc., 67 Wall St., New York 5, N. Y., iron ore recovery plant addns. Total est. $50,000,000. $10,000,000 for 1961.

PUERTO RICO

▲† **Puerto Rico, San Juan**—HOUSING—U. S. Eng., 575 Riverside Ave., Jacksonville 1, Fla., U. S. A., plans by J. Brooks Haas, 115 Park St., Jacksonville Fla., U. S. A., 100 unit Capehart Housing, Fort Buchanan. $1,650,000. CD 8/18.

AMERICANS ABROAD

▲ **Philippines, Manila**—Govt. of Philippine Islands, wharves and channel imprvs. $25,000,000. Rader & Assocs., 100 S. Biscayne Blvd., Miami, Fla., U.S.A., consult. engrs.

FOREIGN

▲ **Australia**—WINTER RESORT, etc.—Ernest Forras, c/o International Business Relations, Inc., 209 Post St., San Francisco, Calif., U. S. A. (to Jan. 14, 1961) and International Business Relations, Inc., 527 Madison Ave., New York, N. Y., U.S.A. (Jan. 15 to Feb. 28, 1961), winter resort, ski hotel, ski lift combination at Horse Hill, Mt. Buller, summer resort, boatel at Swanson Point on Eldon Weir. $1,130,000.

▲ **Belgium**—Ministry P. Wks., Brussels, reconstr. about 12 bridges. $2,000,000-$2,200,000.

▲ **Belgium**—Ministry of P. Wks., Brussels, modernize Albert Canal. $21,000,000.

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Latest addition to Barber-Greene Finisher line is a new step forward in advanced design and superior performance.

Barber-Greene's Model SA-40 is a new achievement in ease of operation and automatic features, combined with simple construction for greatest accessibility and ease of maintenance.

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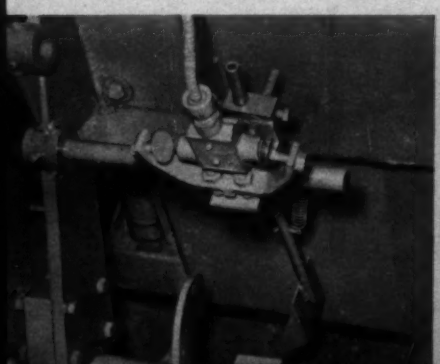

Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
December 6 Massachusetts

▲ **Mass., Pittsfield**—BA 12/7—City, Sewer Comn., Dpt. P. Wks., 33 Pearl St., (1) structure housing grit removal, screening and power facilities (2) sludge digestion tanks and connecting structure (3) mixing flocculation and sedimentation basins. $2,000,000. Camp, Dresser & McKee, 18 Tremont St., Boston 8, Mass. (Correction—cost and engineers address). CD 11/7.

BUILDINGS—BA

▲ **Me., Rockland**—SCHOOL—BA 12/15—School Administration Dist. No. 5, Towns of Rockland and Owlshead and South Thomaston, Me., Supt. Schools, North School, Rockland, Area High School, Broadway and Cedar Sts. $1,250,000. Plans deposit $50. Bunker & Savage, 86 Court St., Augusta, archts. Vernon T. Swain, 511 Sewall St., Augusta, elec. engr. CD 8/11.

HEAVY CONSTRUCTION—LB & CA

▲† **J. F. White Contg. Co.**, P. O. Box 358, Westwood, Mass., LB $1,320,000, est. $1,185,569, (7 bidders), constr. cooling water canal first stage Fox Point Hurricane Barrier, Providence, ENG-10-016-61-10, RHODE ISLAND. U. S. Eng., 424 Trapelo Rd., Waltham, Mass. CD 10/18.

CONNECTICUT—State Hy. Comr., 170 Douglas St., Hartford,
Savin Bros., Inc., 522 Cottage Grove Rd., Bloomfield, Conn., CA $921,262, Projs. 63-158 & 63-163, 427 lin. ft. rein.-con., pavement, on section of east-west bound roadway on Interstate Route 84, Morgan St., Interchange incl. structures, N. E. Ramp at Morgan St. Interchange, Hartford, CONNECTICUT. Bids Oct. 10, awarded Nov. 15. CD 10/14.

BUILDINGS—LB & CA

▲ **Sawyers Constr. Co.**, Blanchard Rd., Burlington, Mass., LB $1,641,000, HOUSING, 100 units, two sites, DOVER, N. H. Dover Housing Authority, 93 Pleasant Valley View Circle, Dover, N. H. CD 10/27.

▲ **Gilbane Constr. Co.**, 90 Calverly St., Providence, R. I., CA Est. $4,000,000, 20 story, 31,000 sq. ft., glass and aluminum, Tower House Motor HOTEL, Dorrance, Clifford, Eddy and Friendship Sts., PROVIDENCE, R. I. First Republic Corp., 375 Fifth Ave., New York 16, N. Y. Heyward-Robinson Co., 114 Liberty St., New York 6, N. Y., engrs. Constr. Spring 1961. CD 4/20.

▲ **East Hartford Plaza Corp.**, c./o David T. Chase, 85 King Philip Drive, West Hartford, Conn., Owner Builds, $2,160,000, 216,000 sq. ft. SHOPPING CENTER, Main St., EAST HARTFORD, CONN. Topps Discount City Food Mart, S. S. Kresge, lessees. CD 1/20.

▲ **Lifetime Homes, Inc.**, 523 Boston Post Rd., Old Saybrook, Conn., Owner Builds, $1,767,000. 114 HOUSES, Carriage Hill, EAST LYME, CONN. CD 11/10.

▲ **Thomas E. Baggott**, Nod Rd., Ridgefield, Conn., Owner Builds, $1,000,000, 100 HOUSES, Nod Rd., RIDGEFIELD, CONN.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
December 8, 15 New Jersey

▲ **N. J., Secaucus**—BA 12/6—Town, Town Hall, sewerage sys. and treatment plant. $3,000,000. Homer O. Smith, c/o owner, engr. CD 10/15/59.

▲ **Pa., Phila.** — TERMINAL BLDG. EXTENSION — BA 12/16—Dpt. Procurement, Room 313, City Hall Annex, terminal bldg. extension, Philadelphia International Airport, Pier No. 3, for Dpt. Commerce, Div. Aviation. Plans deposit Bid 6673 general construction $50. CD 9/1.

BUILDINGS—BA

▲ **Md., Baltimore**—OFFICE—BA 12/6—The Martin Co., Middle River, (selected list bidders) steel, concrete, masonry air conditioned office, Friendship International Airport. $1,000,000. Donald B. Ratcliffe, 34 W. 25 St., Zone 18, archt. CD 8/25, under Airports.

▲† **Md., Edgewood**—BARRACKS, etc.—BA 12/14—U. S. Eng., 24 St. and Maryland Ave., Baltimore, Zone 18, two 3 story, masonry barracks, consolidated mess, administration, outside utilities and site imprvs. Army Chemical Center, ENG-18-020-61-7. $1,500,000. McGaughan & Johnson, 2000 P St. N.W., Wash. 6, D. C., archts.-engrs. CD 9/8/58.

▲ **N. Y., East Northport**—CHURCH, etc.—BA 12/14—Catholic Diocese of Rockville Centre, 253 Sunrise Hy., Rockville Centre, church and convent for St. Anthony of Padua Parish. $1,000,000. Ballard Todd & Snibbe, 123 E. 77 St., New York, Zone 21, archts.

▲ **N. Y., North Babylon**—SCHOOLS—BA 12/14—Bd. Educ. UFSD No. 3, Weeks Rd., elementary school, $1,150,000; Junior High School, $1,750,000. Plans deposit $50. Kelly & Gruzen, 10 Columbus Circle, New York, N. Y., archts. Joseph R. Loring & Assoc., 25 W. 45 St., New York, N. Y., engrs.

▲ **N. Y., Cheektowaga**—WAREHOUSE—BA 12/21—S. M. Flickinger Co. Inc., 180 Niagara Frontier Food Terminal, Buffalo, (selected list bidders) warehouse. $1,300,000. Stanley Podd, 361 Delaware Ave., Buffalo, archt. CD 6/28.

▲ **N. Y., Central Islip**—SCHOOLS—BA 1/11—Bd. Educ., U.F.S.D. No. 13, Islip, Junior High School, South end Area. $2,400,000; addn., alterations Wheeler Rd. School. $425,000. Frederic P. Wiedersum Assocs., 65 Roosevelt Ave., Valley Stream, archts. S. Cafarelli, 65 Roosevelt Ave., Valley Stream, mechanical engr. Seelye, Stevenson, Value & Knecht, 101 Park Ave., New York, Zone 17, structural engrs. CD 10/12.

BUILDINGS—SLC

▲ **N. Y., Bronxville**—HOSPITAL—Lawrence Hospital, 55 Palmer Ave., soon lets contract 6 story hospital addn. $2,000,000. Frederick G. Frost Jr. & Assocs., 144 E. 30 St., New York, Zone 16, archts. Jaros, Baum & Bolles, 415 Lexington Ave., New York, Zone 17, mechanical engrs. Sigmund Roos, 144 E. 30 St., New York, Zone 16, structural engr. CD 5/1/59.

HEAVY CONSTRUCTION—LB & CA

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,
N. Y.—John C. Peterson Constr. Corp., 958 Church St., Baldwin, N. J., CA $1,918,022, est. $2,771,000 b. conc. 1.99 mi., misc. work 0.36 mi. total 2.35 mi. Jericho Turnpike Pt. 1, Jamaica Ave. SH 1831; Jericho Turnpike Pt. 2, Jamaica Ave. SH 1940; Jericho Turnpike, SH 9020; Jericho Turnpike-Floral Park Village, SH 60-20. Proj. U-1000 (7) Nassau and Queens Counties. Awarded Oct. 18,
N. Y.—Mt. Vernon Constr. Corp. & Colonial Asphalt Paving Corp., 22 W. First St., Mt. Vernon, N. Y., CA $708,622, est. $781,000, 9 in. cem. conc. pavt. 2-24 ft. var., 1.48 mi. b. conc. 0.16 mi. misc. 0.05 mi. New Jersey State Line, Congers, Pt. 1, SH 1898, New Jersey State Line-Congers, Pt. 2-SH 8448, Proj. U-528(8), Rockland Co. Bids Sept. 21, awarded Oct. 26. CD 9/22, under LB.

▲ **NEW YORK**—State Hy. Dpt., State Office Bldg., Albany,
N. Y.—Peter Kiewit Sons Co., P. O. Box 224, Eastwood Sta., Syracuse 6, N. Y., CA $1,669,048 b. conc. Type 1A 10.38 mi. twin conc. box 2 spans 30 ft. total Red Creek-Southwest Oswego Pt. 3, SH 8214, Red Creek-Southwest Oswego, Pt. 4, SH 8189, Red Creek-Southwest Oswego Pts. 1 & 2 & 4, SH 5717, Rte. 104, R. C. 60-169, Cayuga and Oswego Counties;
N. Y.—Serafini Constr. Co., Inc., P. O. Box 265, Binghamton, N. Y., CA $732,135, est. $843,000. b. conc. 5.87 mi. incl. bridge rehabilitation, Honeoye-Vicent SH 8178 Honeoye-Hemlock, SH 191, Livonia-Ontario County Line, SH 717, Rte. 20 A.R.C. 60-145, Livingston and Ontario Counties. Bids Oct. 20, awarded Nov. 17. CD 10/21, under LB.
Namron Constr. Corp., 43 N. Village Ave., Rockville Centre, N. Y., LB $866,397 (8 bidders), Contr. BP-210.003, pier shed for Pier No. 8, Brooklyn Port Authority Piers, BROOKLYN, N. Y. Port of New York Auth., Rm. 1100, 111 Eighth Ave., New York 11, N. Y. Bids Nov. 22. CD 10/27.

▲ **PENNSYLVANIA**—State Hy. Dpt., Harrisburg, Bids opened 11/18,
Pa.—Weaver Coal & Constr. Co., Inc., 543 Locust Valley Rd., Greensburg, Pa., LB $521,419, rein.-con. 22 ft. wide and earth median 20 ft. wide adjacent existing rd., 12.135 ft., 3 bridges, T. R. 119, Connellsville and Bullskin Twps., Fayette Co.;
Pa.—Latrobe Rd. Constr., Inc., P.O. Box 150, Latrobe, Pa., LB $588,593, divided hy. rein.-con. pavement 24 ft. wide, each side 4 ft., conc. divisor, 5,056 ft., T.R. 53, Ferndale Boro, Cambria Co.;
Pa.—H. R. Imbt, Inc., Box 155, State College, Pa., LB $817,644, cr. agg. base with bit. surf. 20 ft. wide, 26,568 ft., 2 bridges, T.R. 322, Ferguson and Harris, Centre Co. CD 11/2.

▲ **PENNSYLVANIA**—State Hy. Dpt., 506 North Office Bldg., Harrisburg, Bids opened Nov. 18,
Pa.—Frank Donatelli & Co., Inc., 5779 Broad St., Pittsburgh, Zone 6, Pa., LB $2,329,419, (9 bidders), three span continuous steel truss br. over Beaver River between Beaver Falls and Eastvale, 1,948 ft., cem. conc. base with bit. surf., 66 ft., 54 ft., 35 ft. and variable width, incl. rein.-con. box culvert, L.R. 77(18), Appl. 124(2), T.R. 588, Proj. No. 8 H., B. 732-1, Beaver Co.
Pa.—Hughes Steel Erection Co., Inc., 3646 N. 2nd St., Phila., Pa., LB $217,637, (3 bidders), repairs to existing viaduct and 1,079 ft. surf. existing pavement with bit. surf. 24 ft. wide, T.R. 260, Frankin-E. Conemaugh, Cambria Co. CD 10/27.

▲ **PENNSYLVANIA** — State Hy. Dpt., 506 N. Office Bldg., Harrisburg,
Latrobe Rd. Constr. Co., P.O. Box 150, Latrobe, Pa., CA $3,042,198, separated hy. of rein.-con. 24 ft. wide each side divisor, 6 bridges, 17,306 ft. Interstate L.R. 1011(1), Turnpike feeder from Reading, Berks Co. Bids Oct. 28. CD 11/1, under LB.

BUILDINGS—LB & CA

▲ **Websco Constr. Corp.**, 108 So. Franklin Ave., Valley Stream, N. Y., LB $2,062,000, (7 bidders), Spec. 15838-C, general contract BLDG. No. 4, incl. service connections, Dpt. P. Works, State Office Bldg., Campus Site, ALBANY, N. Y. State Dpt. P. Wks., State Office Bldg., Albany, N. Y. Bids Nov. 16. CD 10/21;
Tougher Htg. & Plg. Co., 175 Broadway, Albany, N. Y., LB $409,374, (7 bidders), Spec. 15838-H, heating work for Bldg. No. 4, Dpt. P. Wks., State Office Bldg. (Albany, N. Y.);
Nager Electric Co., Inc., 426 Broadway, Brooklyn, N. Y., LB $435,000, (9 bidders), Spec. 15838-E, electrical work, Bldg. No. 4, Dpt. P. Wks., State Office Bldg. (Albany, N. Y.).

▲ **John H. Eisele Co., Inc.**, 18 E. 41 St., New York, N. Y., CA $1,119,800, RESEARCH LABORATORIES and OFFICES alterations, addns., 208-20 Cross Island Parkway, BAYSIDE, N. Y. Sylvania Electric Products, Inc., 460 Market St., Phila., Pa.

▲ **Planet Constr. Corp.**, 11 W. 42 St., New York 36, N. Y., LB $1,617,000, (3 bidders), general contract Phase II, GYMNASIUM, AUDITORIUM and TELEVISION STUDIO addn., George Westinghouse Vocational and Technical High School, Jay, Lawrence and Bridge Sts., Brooklyn Boro, BROOKLYN, N. Y. Deputy Supt. Schools, Bureau Constr., 4 Floor, 42-15 Crescent St., Long Island City 1, N. Y. Bids Nov. 18. CD 10/17.

▲ **Harry & Myron Nelkin**, 290 N. Broadway, Hicksville, N. Y., Owner Builds, $2,750,000, six 300 suite APARTMENTS, south side of Jericho Turnpike west of Guineau Woods Rd., CARLE PLACE, N. Y. Harold Nosow, 74-02 Woodside Ave., Elmhurst, N. Y., archt. CD 7/22.

Romar Constr. Corp., 1 Elmont Rd., Elmont, N. Y., CA $835,350, general contract Washington ELEMENTARY SCHOOL, DEER PARK, N. Y. Deer Park Union Free School Dist. No. 7, 1861 Deer Park Ave., Deer Park, N. Y. Bids Oct. 26. CD 11/3, under LB.

▲ **Colmar Constr. Co.**, 364 Gold St., Brooklyn 1, N. Y., CA $1,531,000, general contract ELEMENTARY and JUNIOR HIGH SCHOOL, ISLAND PARK, N. Y. Bd. Educ. Union Free School Dist. 31, Island Park, N. Y. Bids Oct. 11. CD 10/17, under LB.

▲ **Agora Development Corp.**, 342 Madison Ave., Rm. 606, New York 17, N. Y., Owner Builds, $27,000,000, Westchester Plaza, to incl. 2,000,000 sq. ft. 80 STORES, OFFICE and TRANSPORTATION CENTER, 16 story OFFICE, 265,000 sq. ft. Macy's, 6 level 5300 car parking, 18 acres, NEW ROCHELLE, N. Y. John Graham & Co., 444 5 Ave., New York 18, N. Y. archt. Walter D Binger, 115 E. 40 St., New York 16, N. Y., consult. engr.

▲ **Joseph P. Blitz, Inc.**, 545 Madison Ave., New York 22, N. Y., LB $3,753,000 (7 bidders), fdns. and general contract Alexander Hamilton HOUSES, Proj. No. NYS-81, Section I, which incls. Bldgs. Nos. 4 and 5, incl. stores, boiler room and Community Center, easterly portion of area W. 143 St., 7 Ave., W. 141 St. and 8 Ave., Manhattan Boro, NEW YORK, N. Y. New York City Housing Auth., Rm. 312, 299 Broadway, New York 7, N. Y. Bids Nov. 22. CD 11/17.
Endres Plumbing Corp., 31-65 29 St., Long Island City 6, N. Y., LB $535,000 (7 bidders), plumbing for Alexander Hamilton Houses, Manhattan Boro (New York, N. Y.).
Heating Maintenance Corp. of New York, 220 E. 138 St., New York 51, N. Y., LB $458,000 (5 bidders), heating and ventilating for Alexander Hamilton Houses, Manhattan Boro (New York, N. Y.).

▲ **George A. Fuller Co.**, 597 Madison Ave., New York 22, N. Y. CA Est. $1,500,000, 75,000 sq. ft. DEPARTMENT STORE addn. at site, NEW YORK, N. Y. Alexander's, Fordham Rd. and Grand Concourse, New York 68, N. Y. CD 9/13.

▲ **Wilaka Constr. Co., Inc.**, 11 E. 44 St., New York 17, N. Y., LB $2,469,000, (3 bidders), general contract JUNIOR HIGH SCHOOL 8, 108-35 167 St., Queens Boro, SOUTH JAMAICA, N. Y. Deputy Supt. Schools, Bureau Constr., 4 Floor, 42-15 Crescent St., Long Island City 1, N. Y. Bids Nov. 17. CD 10/17.

▲ **Frank Briscoe Co.**, 287 S. 19 St., Newark, N. J., CA $1,500,000, MAILBAG DEPOSITORY and REPAIR CENTER, River Rd., EDGEWATER, N. J. Cresmire Realty Co., 9 Hudson St., Hackensack, N. J. Porter & O'Brien-O. J. Porter & Co., 415 Frelinghuysen Ave., Newark, N. J., archts.-engrs. U. S. Post Office Department, lessee. Bids Nov. 1, awarded Nov. 21. CD 11/16, under CA.

▲ **Halreid, Inc.**, 252 Madison Ave., Perth Amboy, N. J., Owner Builds, $1,500,000, 78 HOUSES, Tract near New Durham Rd., EDISON, N. J.

▲ **Joseph L. Muscarello, Inc.**, Rte. 17 and Essex St., Maywood, N. J., CA Approx. $2,500,000 HEADQUARTERS BLDG., Rte. 9W ENGLEWOOD CLIFFS, N. J. Volkswagen Corp. of America, 340 Sylvan Ave., Englewood Cliffs, N. J. Bids Oct. 25. CD 10/13.

▲ **Levitt & Sons, Inc.**, Levittown, N. J., Separate Contracts, $1,000,000, 100,000 sq. ft. DEPARTMENT STORE, LEVITTOWN, N. J. Sears Roebuck & Co., lessee.

▲ **Levitt & Sons, Inc.**, Levittown, N. J., Separate Contracts, $1,500,000, 3 story, 150,000 sq. ft. DEPARTMENT STORE, LEVITTOWN, N. J. Allied Department Store, lessee.

▲ **Rutgers University**, 12 College Ave., New Brunswick, N. J., rejected bids Nov. 1, Proj. N. J. 28-CH-21(SA) DINING HALL and GRADUATE RESIDENCE

(Continued on page 105)

New Mirro Aluminum plant can double production without changing electrical system

J-94147-1

you can be sure if it's Westinghouse

PRECEDING PAGE

At top, Mirro Aluminum's handsome new rolling mill at Manitowoc, Wis., is appropriately sheathed in maintenance-free aluminum siding.

At bottom, men who helped Power-Up the new mill inspect a Westinghouse 1000-kva Type ASL ventilated dry-type power center which feeds power to productive equipment. Space has been provided in power center for additional drawout Type DB feeder breakers when needed. On power center platform: W. E. Reimer, Uihlein Electric Co.; J. R. Miller, Westinghouse Construction Engineer; and V. E. Mulvaney, Westinghouse Sales Engineer. Standing below: Roy Angrick, Chief Construction Engineer, Klug & Smith Co.; Edwin Zagrodnik, Mirro Rolling Mill Superintendent; M. E. Hutchins, Mirro Project Engineer and Metallurgist; and H. E. Toll, District A&S Manager, Westinghouse Electric Supply Co.

AT RIGHT

In coil slitting area, a 45-kva DT-3-B dry-type transformer with attached primary circuit breaker is mounted at the load to provide 120/208-volt power for lighting. Maintenance-free, lightweight Westinghouse transformers are easily mounted off the floor. On side of control cabinet: a 225-amp, J-frame Westinghouse AB-I circuit breaker which protects control unit. Talking over plant's electrical system: J. R. Miller, H. E. Toll, Roy Angrick and W. E. Reimer.

J-94147-2

Imposing line-up of 5-kv indoor metal-clad switchgear with Type DH drawout air circuit breakers. Used for control of mill's synchronous and induction motors, they are also used to protect feeder circuits to power centers throughout the plant. (At left) Low-voltage drawout switchgear end of a 1000-kva power center. Messrs. H. E. Toll, W. E. Reimer and M. E. Hutchins inspect 50-DH-250 main breaker compartment.

Westinghouse power system planned for today's . . . and tomorrow's production

The progressive Mirro Aluminum Company has taken a big step forward in its long-range expansion program. Recently completed: a heavy-duty, fully integrated aluminum rolling mill at Manitowoc, Wis., covering 238,818 square feet. Present annual capacity: 60 million pounds of aluminum for use in cookware, electric housewares, boats, foil, toys, and component parts for industry. Anticipating Mirro's production goals and planned product diversification, plant output can be doubled . . . *with no major alterations in the plant's electrical system.*

Westinghouse, working closely with Mirro representatives, the consulting engineer and electrical contractor, participates in the design of a plant system that's adequate for today, ready for tomorrow. Standard Westinghouse apparatus, capable of meeting the stringent requirements of process equipment, was specified for the primary distribution system. Eliminated was the need for expensive, specially engineered or custom-built apparatus.

The planning team found that a simple, modified, modern radial distribution system using 5-kv Type DH breakers feeding individual power centers at main points of load would best serve the plant. Distributing high-voltage power, this type of system reduces losses, cuts feeder circuit costs and improves voltage regulation. A definite requirement of process equipment switching was drawout Type DB, heavy-duty circuit breakers which can be easily inspected and maintained.

Realizing that every possible inch of floor space should be productive, the team chose Westinghouse equipment that could be installed in out-of-the-way areas yet provide on-the-spot power. For example, the maintenance-free, ventilated dry-type power center transformers are approximately 33% lighter than liquid units of same ratings. They can be mounted on overhead platforms or balconies near the loads served, but out of productive areas. Aluminum busbars in the switchgear also reduce weight and require smaller platforms to support the power center. *(cont'd.)*

YOU CAN BE SURE... IF IT'S Westinghouse

J-94147-B

At aluminum casting station, a 30-hp, totally enclosed, fan-cooled Westinghouse Life-Line® "A" motor drives a hydraulic pump. Sealed, prelubricated ball bearings eliminate greasing, while Bondite-Mylar* insulation means longer motor life, longer continuous production. Roy Angrick and V. E. Mulvaney check the installation.

*Du Pont registered trade-mark

W. E. Reimer explains to H. E. Toll and Edwin Zagrodnik how 4160-volt, unfused, 600-amp, Westinghouse Type LCB switch serves as a disconnect switch for drive motor in plant's 800-hp foil mill motor-generator set. Switch is wall mounted to save space. Westinghouse oiltite pushbutton station remotely starts motor at metal-clad switchgear.

Power comes to Mirro's plant at 67,000 kv and is stepped down to 2520/4360 volts by three Westinghouse 2500-kva, Type SL, single-phase transformers. (Fourth unit is a spare.) Transformers are protected by Westinghouse-developed Insuldur®, the ultimate in insulation, which allows peak period overloads without damage. Shown are M. E. Hutchins, V. E. Mulvaney and Edwin Zagrodnik.

Necessary 480-volt power for plant is carried from small, outdoor transformers to indoor switchgear by weatherproof, low-impedance, 1350-amp Westinghouse bus duct that assures high efficiencies of feeder circuits. Tap openings conveniently spaced along duct provide easy means of connection to power company transformers.

Gleaming spools of aluminum foil produced in new Mirro rolling mill are ready for retail packaging for consumer use.

Westinghouse Powers-Up Mirro Aluminum plant *(cont'd.)*

In industrial plants, Powering-Up electrically with an eye on today's *and* tomorrow's needs can mean outstanding benefits and savings. For information about how Westinghouse can help you Power-Up, see your nearest Westinghouse distribution outlet . . . or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

OWNER: Mirro Aluminum Company, Manitowoc, Wis.
CONSULTING ENGINEER and GENERAL CONTRACTOR: Klug & Smith Co., Milwaukee, Wis.
ELECTRICAL CONTRACTOR: Uihlein Electric Co., Milwaukee, Wis.
WESTINGHOUSE DISTRIBUTOR: Westinghouse Electric Supply Co., Milwaukee, Wis.

J-94147-4

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

(Continued from page 100)

HALL, NEW BRUNSWICK, N. J. LB $1,995,357. Will re-advertise. CD 11/9, under LB.

Wigton-Abbott Corp., 1225 South Ave., Plainfield, N. J., CA design and construct 115,000 sq. ft. PHARMACEUTICAL PLANT, NUTLEY, N. J. Hoffman-LaRoche, Inc., 340 Kingsland Rd., Nutley, N. J.

▲ **Fred J. Brotherton, Inc.,** 185 Atlantic St., Hanckensack N. J., CA Est. $3,000,000 PLANT, off Union Blvd., TOTOWA, N. J. Yardley of London, 600 Palisade Ave., Union City, N. J. Bids Nov. 4. CD 10/27.

▲ **R. M. Shoemaker Co.,** 245 S. 24th St., Phila., Pa., CA $1,500,000, 2 APARTMENTS, Restaurant and outdoor swimming pool, KING OF PRUSSIA, PA. Anthony J. Volpe, c/o Haag & d'Entremont, archts., 400 Cedar St., Jenkintown, Pa. Awarded Nov. 18.

▲ **Koppers Co.,** Koppers Bldg., Pittsburgh, Pa., CA, 8 ELECTROSTATIC PRECIPITATORS at Pittsburgh Works, PITTSBURGH, PA. Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.

▲ **Capital Properties, Inc.,** 201 Pennsylvania Ave., S.E. Wash., D. C., LB $1,312,000, (5 bidders), lease-build VEHICLE MAINTENANCE FACILITY northwest corner, Maryland Ave. and Oliver St., BALTIMORE, MD. Post Office Dpt., Baltimore Region, Main Post Office Bldg., Rm. 2012, Baltimore, Md. Bids Nov. 18. CD 10/26.

Hallock Constr., Inc., Easton, Md., CA $770,890, South Caroline HIGH SCHOOL, FEDERALSBURG, MD. Caroline Co. Comrs., Federalsburg, Md. CD 9/1, under LB.

▲† **Noair Engineering Corp.,** 1118 22 St. N.W., Wash., D. C., LB $1,998,700, (8 bidders), LABORATORY, Goddard Space Flight Center, Inv. S-183, GREENBELT, MD. National Aeronautics & Space Admin., 1520 H St. N.W., Wash., D. C. Bids Nov. 21. CD 11/18.

▲ **Cafritz Constr. Co.,** 1625 Eye St. N.W., Wash., D. C., LB $2,380,000, (7 bidders), New LINCOLN BRANCH BANK, 17th and H Sts. N.W., WASH., D. C. Riggs National Bank, 1530 Pennsylvania Ave. N.W., Wash., D. C., Mills, Petticord & Mills, 3308 14th St. N.W., Wash., D. C., archts. Bids Nov. 16. CD 10/17.

SOUTH

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES
December 9 Tennessee

STREETS AND ROADS
December 6 West Virginia — December 8, 15 Florida
December 9 Tennessee — December 16 Kentucky
December 21 Louisiana

▲ **Virginia**—TUNNEL APPROACHES, etc.—BA 1/11—Elizabeth River Tunnel Comn., City Hall Bldg., 235 Plume St., Norfolk, excav. constr. East and West tunnel approaches, railroad bridge over East Tunnel approach, 2 superstructures ventilating bldgs., portal tide gate house, tunnel finish and bit. conc. paving, mechanical and electrical work, Contr. 2, Second Elizabeth River Tunnel, Parsons, Brinckerhoff, Quade & Douglas, 165 Broadway, New York 6, N. Y., engrs. CD 11/25/59.

BUILDINGS—BA

Ala., Tuscaloosa—CHEMISTRY—BA 12/13—University of Alabama, P.O. Box 2017, Tuscaloosa, 4 story chemistry bldg. $850,000. Warren, Knight & Davis, Protective Life Bldg., Birmingham, archts. CD 7/11.

▲ **N. C., Charlotte**—SCHOOL—BA 12/13—Mecklenburg Co. Bd. Educ., 825 Westbrook Dr., 115,000 sq. ft. Ashley Park High School. $1,300,000. Plans deposit $50. McDowell & Brackett, 221 S. Church St., archts. CD 10/7.

▲ **Va., Williamsburg**—CONVALESCENT, etc.—BA 12/14—Commonwealth of Virginia, State Hospital Bd., 9 N. 12th St., Richmond, four 2 story, 26,000 sq. ft. acute convalescent bldgs., Eastern State Hospital, $1,500,000, Bernard B. Spiegel, Kresge Bldg., Norfolk, archt., Edwin B. Small, Kresge Bldg., Norfolk, struct. engr., CD 9/23; 1 story, 24,000 sq. ft. continued treatment bldg., Eastern State Hospital, $400,000, Rawlings & Wilson, 1000 N. Thompson St., Richmond, and Leary & Ciucci, 1 E. Main St., Richmond, archts., William T. St. Clair, 601 E. Franklin St., Richmond, struct. engr. CD 9/26.

Ky., Louisville—MEDICAL ARTS—BA 12/15—V. V. Cooke, 953 S. 3 St., Zone 2, 8 story, brick, rein.-con. medical arts bldg., Brook and Gray Sts. Over $750,000. Jas. H. Kolbrook, Starks Bldg., Zone 2, archt. E. R. Ronald & Assocs., 554 S. 3 St., Zone 2, engrs. CD 3/24.

▲† **Mo., Fort Leonard Wood**—EM BARRACKS, etc.—BA 12/22—U. S. Eng., 1800 Federal Office Bldg., Kansas City 6., Mo., Second Increment of First Regimental Area, First Battalion Facilities to incl. 2-2 company 40,600 sq. ft. each EM barracks, consolidated mess, administrative and storage bldg. and site imprvts. ENG-23-028-61-39. $2,000,000. Plans deposit $10. CD 11/18.

HEAVY CONSTRUCTION—LB & CA

WEST VIRGINIA—State Rd. Comn., Charleston, Zone 5, **Smith Constr. Co. & C. E. Wetherall Co.,** Box 1397, Huntington, W. Va., CA $962,272, grading, draining, traffic bound base course, b. conc. bottom and wearing courses, 2.97 mi. Kenova-Dock Creek Rd., Secondary Rte. 1, Wayne Co. Bids Nov. 15. CD 11/18, under LB.

▲ **SOUTH CAROLINA**—State Hy. Dpt., Columbia, Bids opened Nov. 15,

S. C.—Dickerson, Inc., Box 448, Monroe, N. C., LB $1,184,839, Alternate 1, (10 bidders), concrete gutter, grading and earth type surf. 5.612 mi. for four lane divided hy. on Interstate Rte. 85 from Rd. S-71 to U.S. Rte. 178; LB $1,184,839, Alternate 2, (4 bidders), cement rubble masonry gutter, F.A. Proj. No. I-85-1(5), S.C. Docket No. 4.506, Anderson Co.; LB $603,707, (6 bidders), grading, macadam base course and b. conc. surf. for widening to 4 lanes 5.708 mi. on US Rte. 76 from Interstate Rte. 85 to Pendleton, F.A. Proj. No. F-285(12), S.C. Docket No. 4.499, Anderson Co.;

S. C.—Hunter Bros. Constr. Co., Gray Court, S. C., LB $187,889, (5 bidders), grading, bit. surf. 10.225 mi. Rds. S-43 and S-58, S.C. Docket No. 42.529, F.A. Proj. No. S-1362(2), Spartanburg Co.;

S. C.—Best Rds., Inc. & Highway Surfacing Co., Box 2285, Greenville, S. C., LB $197,370, (4 bidders), grading, bit. surf. 2.168 mi. Rds. S-110, S-391, S-394, S-395, S-396, S-385, S-386, S-384, S-821, S-156, S-188, S-380, S-379, S-378, S-376, S-387, S-279, S-116, S-413, S-414, S-415, S-416, S-417, S-120 and S-121, S.C. Dockets Nos. 26.384 and 26.386, F.A. Proj. No. S-1613(1), Horry Co.;

S. C.—Satterfield Constr. Co., Greenwood, S. C., LB $194,359, (4 bidders), grading, bit. surf. 1.757 mi. Rds. S-269, S-103, S-270, S-195, S-187, S-204, S-248, S-249, S-250, S-251, S-254, S-255, S-256, S-240, S-258 thru S-267, S-272, S-273, S-116, S-276, S-77, S-223, S-199 and S-239, S.C. Dockets Nos. 24.348 and 24.349, F.A. Proj. Nos. S-1652(1) and S-1653(1), Greenwood Co. CD 10/31.

Curry Builders, King St. Exten., Charleston, S. C. CA $869,000, COLD STORAGE PLANT, N. Charleston Terminal, CHARLESTON, S. C. S. C. State Ports Authority, Customhouse Wharf, Charleston, S. C. Lockwood, Greene Engineers, Inc., Montgomery Bldg., Spartanburg, S. C., and Palmer & Baker Engineers, Inc., 2460 Government St., Mobile, Ala., engrs. CD 10/12.

▲ **GEORGIA**—State Hy. Dpt., No. 2 Capitol Square, Atlanta, Bids opened 11/18,

Rogers Bridge Co., Inc., P. O. Box 145, Waycross, Ga., LB $1,435,480, (8 bidders) 4 bridges, approaches at interchange of Interstate Hys. 75 and 20, Pryor St. and Memorial Dr. in Atlanta, Fulton Co. CD 11/10.

▲ **GEORGIA**—State Hy. Dpt., No. 2 Capitol Square, Atlanta, Bids opened 11/18,

Burtz-Durham Constr. Co., 2485 Bryan Circle, Atlanta, Ga., LB $1,575,657, (16 bidders), 0.349 mi. 4-lane road, one bridge on Columbus-Opelika Rd, across Chattahooghee River, Muscogee Co. CD 11/10.

† **Green Constr. Co.,** Box 157, Oaktown, Ind., CA $756,535, constructing Canal 25 section 2, St. Lucie County, west of Fort Pierce, Central and Southern Florida Flood Control Proj., CIVENG-08-123-61-19, FLORIDA. U. S. Eng., Box 4970, Jacksonville, Fla. Bids Oct. 26, awarded Nov. 15. CD 11/3.

Bay Dredging & Constr. Co., Oak Ave. and River St., Tampa, Fla., LB $767,231, est. $1,174,000, (5 bidders), 2,378 ft. 2 lane bridge, Clearwater Beach and Sand Key, (approach rds. toll plaza not incl.), CLEARWATER, FLA. City, City Hall, Clearwater, Fla. Bids Nov. 16. CD 11/3.

▲ **ALABAMA**—State Hy. Dpt., Montgomery, Zone 4,

Ala.—Ballenger Paving Co., Inc., Box 228, Greenville, S. C. & **Southeastern Hy. Contr. Co.,** Gainesville, Ga., CA $1,535,311, base and bit. 13.651 mi. from County Road 6 to Ala. 83 on Inter Route 65; Prop B. 7.222 mi. Conecuh Co.;

Ala.—Hodges & Co., Inc., 610 Chestnut, Anniston, Ala. CA $565,514, base and pavement 4.158 mi. U. S. 431 from Anniston NW toward Gadsden, Calhoun Co.;

Ala.—Burgreen Constr. Co., Inc., Box 901, Athens, Ala. CA $535,313, base and bit. 10.203 mi. Ala. 157 from Ala. 20 SE to Lawrence County Line, Colbert Co.;

Ala.—Wright Constr. Co., Brookhaven Rd., Columbus, Ga., CA $1,273,906, base and bit. 13.651 mi. from County Road 6 NE to Ala. 83 on Inter Rte. 65, Prop. A. 6.429 mi. Conecuh Co. Grand total $3,910,942. Bids Sept. 23. CD 9/30, under LB.

▲ **ALABAMA**—State Hy. Dpt., Montgomery, Zone 4,

A. E. Burgess Co. Inc., Pinson Hy., Birmingham, Ala., CA $2,517,829, base and concrete pavement, 8.589 mi. from Argo NE to Ala. 23 on Inter Rt. 59, Jefferson and St. Clair Counties. Bids Oct. 21, awarded Nov. 16. CD 11/1, under LB.

▲ **LOUISIANA**—State Dpt. Hys., Rm. 426, Headquarters Admin. Bldg., Baton Rouge,

Sabine Dredging & Constr. Co. Inc., Box 548, Port Arthur, Tex., CA $1,180,646, hydraulic embankment Pontchartrain Bridge, Slidell Hy. 2.2 mi. SP 740-00-45, FAP 1-10-5(301)263, St. Tammany Parish. Bids Sept. 21, awarded Oct. 17. CD 9/28, under LB.

Louisiana Paving Co., Kenner, La., CA $807,803 c. conc. roadway pavt. and drains, guttering, etc., HOUMA, LA. Mayor & Board, City Hall, Houma, La. Bids Nov. 9. CD 10/28.

▲ **KENTUCKY**—Commonwealth of Kentucky, Dpt. Hys., Frankfort, Bids opened 11/18,

Ky.—W. L. Haper, 1073 Emerson, Park Hills, Covington, Ky., LB $1,427,851, (8 bidders), c. conc. pavt. 4.646 mi. Covington-Lexington-Tennessee State Line Rd. I 75-7(13)173, SP 8-550, Boone Co. CD 10/27;

Ky.—Shamrock Corp. of Kentuckiana, Pleasure Ridge Park, Ky., and **A. J. Schneider,** 3720 7 St. Rd., Shively, Ky., LB $2,098,343, (10 bidders), c. conc. pavt. 7.367 mi. Covington-Lexington. I 75-7(4)157, Grant Co., CD 10/27;

Ky.—Lovell & Hart, Inc., 1429 New Circle Rd., Lexington, Ky. LB $675,992, (6 bidders), b. conc. Class I, Lexington-Richmond, F 124(8), Fayette Co. CD 11/3.

▲† **C. A. Parsons & Co., Ltd.,** 56 Victoria St., SW 1, London, England, LB One Unit $13,215,000; LB Both Units $25,902,500, one or two turbo-generators for Steam Plant, X-3, 1,072,800 horse power, 800,000 kilowatts, TENNESSEE. Tennessee Valley Authority, 410 Union Ave., Knoxville, Tenn. Site not selected. CD 10/13.

BUILDINGS—LB & CA

▲ **English Constr. Co.,** Main St., Box 191, Altavista, Va., LB $3,194,000, Fishersville HIGH SCHOOL; Churchville HIGH SCHOOL; HIGH SCHOOL, STAUNTON, VA. Augusta Co. School Bd., Staunton, Va. Smithey & Boynton, 319 McChanhan S.W., Roanoke, Va., archts. Bids Nov. 16. CD 10/24.

▲ **DeKalb Co. Bd. Educ., DeKalb Bldg., Decatur, Ga.,** cancelled bids to have been opened Dec. 6, 120,000 sq. ft. central DeKalb HIGH SCHOOL, DECATUR, GA. $1,000,000. CD 11/15.

▲ **Oldaker Constr. Co.,** 407 Ridgewood Ave., Ormond Beach, Fla., CA $460,000, 9 story SHOPPING CENTER ADDN., DAYTONA BEACH, FLA. Sunshine State Shopping Centers, Inc., 2565 N. Atlantic Ave., Daytona Beach, Fla., CD 10/21;
Jehle Bros., 1616 Mt. Meegs Rd., Montgomery, Ala., CA Approx. $750,000, 1,250 seat THEATRE, (Daytona Beach, Fla.).

▲ **William A. Berbussee, Jr.,** 322 Royal Palm Way, Palm Beach, Fla., CA $1,143,000, COUNTY COURTHOUSE EXPANSION, FORT MYERS, FLA. Bd. Comrs., Lee County Courthouse, Fort Myers, Fla. Bids Sept. 20. CD 9/27, under LB.

▲ **Gregg, Gibson, Gregg,** 1016 Northern Blvd., Leesburg, Fla., CA Approx. $1,000,000, SHOPPING CENTER and BOWLING ESTAB., LAKE CITY, FLA., Sunshine State Shopping Centers, Inc., 2526 N. Atlantic Ave., Daytona Beach, Fla. Robert Lee Grundman, 1102 34th St. N., St. Petersburg, Fla., archt. CD 10/28.

Clutter Constr. Corp., 377 Westward Dr., Miami Springs, Fla., CA $976,000, Stoney Brook JUNIOR HIGH SCHOOL, NW 24 Ave. and 175th St., MIAMI, FLA. Dade County Bd. Pub. Instruction, 1410 NE 2nd Ave., Miami, Fla. Watson-Deutschman & Druse, 811 Chamber of Commerce Bldg., Miami, Fla., archt. Bids Nov. 16. CD 11/1.

▲ **Gregg, Gibson, Gregg,** 1016 Northern Blvd., Leesburg, Fla., CA $2,200,000, SHOPPING CENTER and BOWLING ESTAB., MT. DORA, FLA. Sunshine State Shopping Centers, Inc., 2526 N. Atlantic Ave., Daytona Beach, Fla. Robert Lee Grundman, 1102 34th St. N., St. Petersburg, Fla., archt. CD 10/20.

▲ **Gregg, Gibson, Gregg,** 1016 Northern Blvd., Leesburg, Fla., CA Approx. $1,460,000, SHOPPING CENTER, TALLAHASSEE, FLA. Sunshine State Shopping Centers, Inc., 2526 N. Atlantic Ave., Daytona Beach, Fla. Robert Lee Grundman, 1102 34th St., N., St. Petersburg, Fla., archt. CD 10/20.

▲† **General Electric Co.,** 1 River Rd., Schenectady, N. Y., CA $1,002,250 (4 bidders), TRANSFORMER, Widows Creek, ALABAMA. Tennessee Valley Auth., Sprankles Bldg., Knoxville, Tenn. Awarded Nov. 8. CD 10/7/57.

▲† **Raytheon Mfg. Co.,** Foundry Ave., Waltham, Mass., CA $2,973,976, Hawk MISSILE SYSTEM, HUNTSVILLE, ALA., Procurement Office, Redstone Arsenal, Huntsville, Ala. Awarded Nov. 6. CD 2/26/59.

H. A. Smith, 252 Shadyside Lane, Montgomery, Ala., Owner Builds, $720,000, 40 RESIDENCES, MONTGOMERY, ALA.

▲ **M. T. Reed Constr. Co.,** P.O. Box 1066, Jackson, Miss., LB $1,627,333, general contract 8 story, concrete frame, granite, etc., OFFICE, JACKSON, MISS. First Federal Savings & Loan Assn., 204 S. State St., Jackson, Miss. Bids Nov. 15. CD 11/2.

Cunningham Limp Constr. Co., 3087 Grand Blvd., Detroit, Mich., LB $897,000, (4 bidders), 1 story, 166,400 sq. t. GARMENT FACTORY, EMINENCE, KY. City, City Hall, Eminence, Ky. Red Head Brand, Div. Brunswick Corp., 4311 Belmont Ave., Chicago, Ill. lessee. Bids Nov. 18. CD 11/9.

▲ **Hargett Constr. Co.,** 113 Walton Ave., Lexington, Ky., CA $1,173,471, 1 story, 160,000 sq. ft. FACTORY and OFFICE, GEORGETOWN, KY. City, City Hall, Georgetown, Ky. Hoover Ball Bearing Co., Lennox and Hoover Sts., Ann Arbor, Mich., lessee. Bids Nov. 14, awarded Nov. 16. CD 11/17, under LB.

▲ **Dahlem Constr. Co.,** 984 Baxter Ave., Louisville 4, Ky., CA Est. $2,500,000, 2 story, 200,000 sq. ft. SHOPPING CENTER, LOUISVILLE, KY. Mid-City Development Assoc., Inc., Louisville Trust Co. Bldg., Louisville Ky. Braun & Ryan, 1208 Heyburn Bldg., Louisville 2, Ky., archts. Carr-Roy & Assoc., 310 Commerce Bldg., Louisville 2, Ky., engrs.

▲ **Robert C. Crouch Co.,** Sterick Bldg., Memphis, Tenn., LB $1,959,000, West Wing Erlanger HOSPITAL ADDN., 241 Weihl St., CHATTANOOGA, TENN. City and Hamilton Co., Court House, Chattanooga, Tenn. CD 10/25, under Commercial Buildings.

▲ **General Electric Co.,** 415 Frazier Ave., Chattanooga, Tenn., CA $1,497,911, est. $1,500,900 (6 bidders), REACTORS-TRANSFORMERS; LB $242,800, est. $250,000, (5 bidders), DISCONNECTING SWITCHES, Paradise Steam Plant, PARADISE, KY. Tennessee Valley Auth., New Sprankles Bldg., Knoxville, Tenn. Grand total $3,710,489. Awarded Nov. 18. CD 3/25.

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McGraw-Edison Electric Co., Canonsburg, Pa., CA $1,497,911, est. $1,500,000 (5 bidders), TRANSFORMER, Paradise Steam Plant (Paradise, Ky.).
Gary Steel Products Co., Lynchburg, Va., CA $471,867, est. $500,000 (5 bidders), air and gas ducts, Paradise Steam Plant (Paradise, Ky.).

▲† Paul Tishman Co., 21 E. 70th St., New York, N. Y., LB $8,433,987, COURTHOUSE and FEDERAL OFFICE, Proj. 40906, MEMPHIS, TENN. Public Bldg. Service, GSA, Region 4, Peachtree, 7th Bldg., 50 Seventh St. N.E., Atlanta, Ga. A. L. Aydelott & Associates; and Thomas F. Faires & Assoc., Inc., Falls Bldg., Memphis, Tenn. archts. CD 10/12.

▲ R. C. Matthews Constr. Co., 478 Craighead Ave., Nashville, Tenn., CA Est. $1,000,000, APARTMENT and parking garage, Leake Ave. near Harding Rd., NASHVILLE, TENN. Leake Ave. Properties, c/o Waterfield & Bass, archts., 226 Capitol Blvd. Bldg., Nashville, Tenn.

▲ R. C. Matthews Constr. Co., 478 Craighead Ave., Nashville, Tenn., CA Est. $1,000,000, APARTMENT, 2302-04 West End Ave., NASHVILLE, TENN. General Enterprises Corp., 1000 American Trust Bldg., Nashville, Tenn. Steinbaugh & Associates, 3rd National Bank Bldg., Nashville, Tenn., archts.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
December 13, 15 Ohio
STREETS AND ROADS
December 13, 15 Ohio

BUILDINGS—BA

▲ Wis., Madison—EXTENSION DIVISION—BA 1/5—University of Wisconsin, extension Division Bldg. $1,675,000. Plans deposit $50. Brust & Brust, 1212 W. Wisconsin Ave., Milwaukee, archt. CD 8/21.

▲ O., Kent — CLASSROOM — BA 1/6 — Dpt. P. Wks., State Depts. Bldg., Columbus, classroom bldg., Kent State University. $1,900,000. CD 11/25/59.

HEAVY CONSTRUCTION—LB & CA

▲ OHIO—State Hy. Dpt., State Depts. Bldg., Columbus, Zone 15,
O.—D. E. Goodchild, Inc., P.O. Box 184, Circleville, O., CA $148,270, est. $163,600, (5 bidders), Type T 35, B 19, structure 0.785 mi., S.R. 380-8.01, 6.88, S-1120 (4) City of Xenia, Proj. 735, Clinton and Green Counties;
O.—Hinton Constr. Co., 638 N. Main St., Celina, O., CA $182,451, est. $216,000, (2 bidders), Type T 35 on B 19 and structure 1.532 mi. SR 121(28.37-29.40) S-367(3) Village of Versailles, Proj. 736, Darke Co.;
O.—Engle Constr. Co., P.O. Box 5, McArthur, O., CA $131,696, est. $165,200, (6 bidders), Type T 34 on B 19, structure 0.454 mi., SR 233-0.00, 4.30, S-1173(2) Proj. 737, Gallia and Jackson Counties;
O.—Harley E. Calvin & Co., P.O. Box 652, Marietta, O., CA $899,986, est. $982,700, (5 bidders), Type T 35, structure 4.352 mi., SR 7-0.00 (54.09-55.93) Proj. 744, Monroe and Washington Counties;
O.—Don S. Cisle, Contractor, Inc., 504 First National Bank Bldg., Hamilton, O., CA $178,514, est. $214,-500, (4 bidders), Type T 35, 7.168 mi., USR 35 (9.13) (11.42) (11.96) (17.33-17.34) (Parts Nos. 1 to 4 incl.) City of Dayton, Village of West Alexandria, Montgomery and Preble Counties, Proj. 745. Grand total $1,540,827. Bids Nov. 10. CD 10/12.

▲ OHIO—Dpt. Hys., State Depts. Bldg., Columbus, Zone 15,
O.—Harry Miller Excavating Co. & Central States Constr. Co., P.O. Box 54, Suffield, O., CA $6,006,503, Type T 71 and structures, 6.697 mi. S.R. 1, Sections 15.91, 0.00, I 271-6(5)260, I 90-1(20)18, Villages of Mayfield, Highland Heights and Willoughby Hills and Cities of Mayfield Heights and Wickliffe, Proj. 721, Cuyahoga and Lake Counties;
O.—The Horvitz Co., 4375 E. 146th St., Cleveland, O., CA $4,368,774, Type T 71 and structures, 2.48 mi. State Rte. 2, Section 26.04, I 90-1(17)13, City of Euclid, Proj. 722, Cuyahoga Co.;
O.—Herkner Contg. Co. and Herkner Constr. Co., 5450 Hamilton Ave., Cleveland, O., CA $3,067,301, Type T 71, structures, 5.883 mi. USR 6, Section 11.30 F FG 1042(7) Village of Huron and in Perkins and Huron Twps., Proj. 723, Erie Co.;
O.—Don S. Cisle Contractor, Inc., 504 First National Bank Bldg., Hamilton, O., CA $615,153, Type T 35, 5.234 mi. USR 27, Sections (17.70-22.87) Village of Oxford and Village of College Corner, Oxford Twp., Proj. 726, Butler Co. Bids Oct. 25. Grand total $14,057,731. CD 11/10, under LB.

▲ INDIANA—State Hy. Dpt., State House Annex, Indianapolis,
Ind.—Fischer Constr. Co., 10147 Springfield St., Cincinnati, O., CA $1,571,994, rein.-con. pavement, Proj. R 5117, Bartholomew Co.;
Ind.—Spears-Dehner, Inc., 1212 Clark St., Fort Wayne, Ind., CA $1,956,968, rein.-con. pavement, Proj. 5119, Allen and Whitley Counties. Bids Sept. 29. CD 10/5, under LB.

▲ INDIANA—State Hy. Dpt., State House Annex, Indianapolis,
Ind.—R. L. Schutt Co., Inc., 611 N. Park Ave., Indianapolis, Ind., CA $519,821, 5-span cont. steel beam bridge, approach grading, rein.-con. pavement, Proj. US 467(1) Marion 9168, Contract 5053, Marion Co. Bids Sept. 29. CD 10/5, under LB;
Ind.—Maxon Constr. Co., 2600 Far Hills St., Dayton 19, O., CA $1,715,073, 18 span cont. steel plate girder cont. steel beam and rein.-con. girder bridge, approach grading, rein.-con. pavement, Proj. U 889(2) 50-A9-4625, Contract 5106, Knox Co.

▲ Buesching Bros. Constr. Co., 219 E. Berry St., Fort Wayne, Ind., CA $1,694,260 (9 bidders), Div. A, sewage treatment plant addn., MARION, IND. Bd. Pub. Wks. & Safety, City Hall, Marion, Ind. Grand total $3,788,205. Bids Oct. 20. CD 9/26.
Tousley Constr. Co., 925 E. St. Clair St., Indianapolis 6, Ind., CA $297,014 (7 bidders), Div. B, interceptors and relief sewers; CA $290,188 (6 bidders), Div. C, interceptors and relief sewers; CA $99,931 (3 bidders), Div. M, Lomax Ave., pumping station, sanitary relief sewer (Marion, Ind.).
E. A. Taylor & Son, New Lexington, O., CA $848,397 (7 bidders), Div. J, interceptors and relief sewers (Marion, Ind.).
Vogel Constr. Co., Inc., 3760 E. St. Clair St., Indianapolis, Ind., CA $558,415 (3 bidders), Div. K, interceptors and relief sewers (Marion, Ind.).

▲ ILLINOIS—Dpt. P. Wks. & Bldgs., Div. Hys., Centennial Bldgs., Springfield, Bids opened 11/18,
Ill.—Peter Kiewit Sons Co., 1024 Omaha National Bank Bldg., Omaha, Neb., LB $2,048,899, paving paved ramps 2.9 mi. Interchange with Ill. Rte. 92, and frontage road south of Rock Island from ½ mi. east of US Rte. 67, easterly, Rock Island Co.;
Ill.—McCarthy Imprvt. Co., 601 Kahl Bldg., Davenport, Iowa, LB $408,664, base course 0.62 mi., stone base course 1.85 mi., resurf., widening bridge over branch of Spring Creek 2.48 mi., all about 2 mi. northeast of Cambridge, Henry Co. CD 11/3.

▲ Abbot Constr. Co., 5879 N. Lincoln Ave., Chicago, Ill., LB $1,450,000, No. 60.85-60-127, Northwest Braniff Airlines Hangar, Chicago-O'Hare Airport, Park Ridge, CHICAGO, ILL. Dpt. Purchases, City Hall, Chicago 2, Ill. Bids Nov. 15. CD 10/26.

▲ General Services Admin., 219 S. Clark St., Chicago 4, Ill., rejected bids Oct. 12, air-conditioning and alterations to main post office, CHICAGO, ILL. LB $6,233,149. Bladen Abramson & Wolfe, 431 S. Dearborn St., Chicago, Ill., archts. CD 10/26, under LB.

▲ W. E. O'Neil Constr. Co., 2751 W. Clybourn St., Chicago, Ill., LB $3,790,660, (16 bidders), elevated roadway, O'Hare Airport, CHICAGO, ILL. Dpt. Purchases, City Hall, Chicago 2, Ill. Bids Nov. 21. CD 11/3.

▲ MICHIGAN—State Hy. Dpt., 732 Mason Bldg., Lansing 26, Bids opened 11/16,
Mich.—Pierson Contg. Co., 200 Eddy Bldg., Saginaw, Mich., LB $982,137, 4.1 mi. US 27 freeway from Hatton Rd. north to M-61 between Clare and Harrison, Clare Co.;
Mich.—Holloway Constr. Co., Livonia, Mich., LB $2,134,210, 7.6 mi. US 27 freeway (Interstate 75) and 4 structures from Otsego-Crawford County line north to Charles Brink Rd. 5 mi. south of Gaylord Otsego Co., CD 11/10;
Mich.—C. E. Utterbeck, Mt. Pleasant, Mich., LB $702,-325, reconstr., grading, drainage structures and asphalt surf. 14.3 mi. M-30 from Midland-Saginaw County line north to Sanford, Midland Co. CD 1/3.

BUILDINGS—LB & CA

▲ Knowlton Constr. Co., 1133 W. Columbus St., Bellefontaine, O., CA $1,569,360, HIGH SCHOOL, ASHLAND, O. Bd. Educ., Ashland, O. Awarded Nov. 10. CD 11/10, under LB.

▲ Kent Bros. Co., 22 E. Gay St., Columbus, O., CA $1,633,399, Walnut Ridge JUNIOR SENIOR HIGH SCHOOL, Lattimer Dr. and Livingston Ave., COLUMBUS, O. Bd. Educ., 270 E. State St., Columbus, O. Bids Nov. 10, awarded Nov. 15. CD 10/19.

▲ W. W. Spurling Constr. Co., Inc., 5007 New Haven Ave., Fort Wayne, Ind., LB $1,040,353 (5 bidders), Concordia SENIOR HIGH SCHOOL, Zollner Stadium site, FORT WAYNE, IND. Concordia High School, 1715 Maumee Ave., Fort Wayne, Ind. Mox Pohlmeyer & Assocs., Central Bldg., Fort Wayne, Ind., archts. Bids Nov. 17. CD 11/4.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
December 14 Texas
STREETS AND ROADS
December 7 Colorado December 13, 14 Texas

▲† Tex., Sherman—RUNWAY, etc.—BA 12/22—U. S. Eng., 100 W. Vickery Bldg., Fort Worth, runway primary instrument extension and runway overruns, Perrin Air Force Base, ENG-41-443-61-23, $1,000,-000. CD 9/23.

BUILDINGS—BA

▲ Tex., Austin—STATE OFFICE—BA 12/9—State Bd. Control, State Bid. Comn., Main Admin., Capitol Bld., Austin, state insurance office, $1,000,000-$1,750,000. Plans deposit $100. Fehr & Granger, 403 E. 15th St., Austin, Tex., and Pierce & Pierce, 2200 Welch St., Houston, and Broad & Nelson, Merc. Dallas Bld., Dallas, archts. Clark Craig, 403 E. 15th St., and Herman Blum, 1111 Neches St., engrs. CD 4/28.

▲ Okla., Tahlequah—DORMITORIES—BA 12/14—Bd. Regents for Colleges, Rm. 321, Capitol Bldg. 5, Oklahoma City, two dormitories, Northeastern State Teachers College, $1,450,000. Plans deposit $100.

Hudgins, Thompson & Ball, 1411 Classen St., Oklahoma City, archts. CD 5/8/59.

▲ **Tex. Andrews**—HOSPITAL—BA 12/20—Andrews County, Courthouse, Permian General Hospital. $1,500,000. Construction approx. Jan. 1. CD 8/16.

HEAVY CONSTRUCTION—LB & CA

▲ **MINNESOTA**—State Hy. Dpt., Capitol Approach, St. Paul, Bids opened 11/18,

Minn.—**Barton Contg. Co.**, Osseo, Minn., LB $743,636 (6 bidders), grading, gravel base and plant mixed bit. surf. 5.1 mi., Hennepin Co.;

Minn.—**Duininck Bros. & Gilchrist**, Olivia, Minn., LB $983,764 (5 bidders), grading, gravel base and plant mixed bit. surf. 5.1 mi., McLeod Co.;

Minn.—**Park Constr. Co.**, 51 37 Ave. N.E., Minneapolis, Minn., LB $819,209 (5 bidders), grading, gravel base and plant mixed bit. base 15.2 mi., Beltrami and Koohiching Counties;

Minn.—**J. E. Barsness**, Glenwood, Minn., LB $702,972 (10 bidders), grading, gravel base and plant mixed bit. base 16.4 mi., Beltrami and Koohiching Counties;

Minn.—**W. Hodgman & Sons, Inc.**, 921 N. State St., Fairmont, Minn., LB $421,906 (4 bidders), gravel base, soil-cement base, concrete base, plant mixed bit. base road mixed and plant mixed bit. surf. 7.4 mi., Faribault Co. CD 11/2.

BUILDINGS—LB & CA

▲ **Bechtel Corp.**, 220 Bush St., San Francisco, Calif., CA AMMONIA PLANT, FORT MADISON, IOWA. California Spray Chemical Corp., Lucas St. and Ortho Way, Richland, Calif. Total est. $22,000,000. CD 8/25;

Cameron Joyce & Co., Keokuk, Iowa, CA, site grading CHEMICAL FERTILIZER PLANT (Fort Madison, Iowa.)

▲ **Suburban Acres Development Co.**, c/o 2678 Laurel St., Beaumont, Tex., Owner Builds $2,600,000, 195 DWELLINGS, in Suburban Acres, subdivision, BEAUMONT, TEX. Geo. J. Schaumburg, 2678 Laurel St., Beaumont, Tex., engr.

▲ **Tex-Craft Builders, Inc.**, 4904 Travis St., Houston, Tex., Owner Builds, $1,500,000, Ramada Inn HOTEL, steel frame, brick veneer, CORPUS CHRISTI, TEX. Frank Samson, 5417 Crawford St., Houston, Tex., archt.

▲ **Cowdin Brothers**, 411 S. Haskell, Dallas, Tex., LB $1,466,735, est. $1,000,000, (12 bidders), 1 story, approx. 75,000 sq. ft. rein.-con., steel curtain wall and fr. bit. uproof, etc. Our Lady of Good Council HIGH SCHOOL, near Hampton and Ledbetter Rd., DALLAS, TEX. Catholic Diocese of Dallas & Ft. Worth, c/o Bishop T. K. Groman, 2122 Kidwell St., Dallas, Tex. Mullen & Powell, 701 Reliance Life Bldg., Dallas, Tex., engrs. Bids Nov. 15. CD 11/4.

▲ **Kesk, Inc.**, 136 S. Derbigny St., New Orleans, La., CA $7,993,586, 506 Capehart HOUSING UNITS, Fort Bliss, ENG-29-055-61-13, (Original invoice No. 29-005-60-68), EL PASO, TEX. U. S. Eng., 2132 Central Ave. S.E., Albuquerque, N. M. CD 9/8, under LB.

▲ **Tex.-Craft Builders, Inc.**, 4904 Travis St., Houston, Tex., Owner Builds, $1,300,000, Ramada Inn HOTEL, steel, brick veneer, FORT STOCKTON, TEX. Frank Samson, 5417 Crawford St., Houston, Tex., archt.

▲ **Tex-Craft Builders, Inc.**, 4904 Travis St., Houston Tex., Owner Builds, $1,750,000, Ramada Inn Roadside HOTEL, seel frame, brick veneer, FORT WORTH, TEX. Frank Samson, 5417 Crawford St., Houston, Tex., archt.

▲ **Westinghouse Electric Corp.**, 713-2nd Ave., New York, N. Y., CA Approx. $27,500,000, design and construct 350,000 kw. capacity Handley Electric Steam Generating Power PLANT, FORT WORTH, TEX. Texas Electric Service Co., 406 W. 7th St., Fort Worth, Tex. CD 3/6/53.

▲ **Walter Kidde Engineers Southwest, Inc.**, 1205 Holman St., Houston, Tex., CA $1,750,000, Carbon Black PLANT unit, Ship Channel, Strange Rd. at T & N. O. Ry. tracks, HOUSTON, TEX. Columbian Carbon Co., San Jacinto Bldg., Houston, Tex. CD 7/19.

▲ **Tex-Craft Builders, Inc.**, 4904 Travis St., Houston, Tex., Owner Builds, $1,350,000, Ramada Inn HOTEL, steel, brick veneer, LAREDO, TEX. Frank Samson, 5417 Crawford St., Houston, Tex., archt.

▲ **Tex.-Craft Builders, Inc.**, 4904 Travis St., Houston, Tex., Owner Builds, $1,250,000, Ramada Inn HOTEL, steel frame, brick veneer, VICTORIA, TEX. Frank Samson, 5147 Crawford St., Houston, Tex., archt.

▲ **Security Constr. Co.**, Box 30265, Dallas, Tex., CA $1,465,600, 2 story, 170,000 sq. ft., masonry, SENIOR HIGH SCHOOL, WICHITA FALLS, TEX. Wichita Falls Ind. School Dist., Wichita Falls, Tex. Pardue, Reed & Dice, 1901-10th St., Wichita Falls, Tex., archts. CD 11/3.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
December 13 Arizona, Washington

▲† **California**—RADIO TRANSMITTING STATION, etc. —BA 12/15—U. S. Eng., 1209 8 St., Sacramento, addn. to power and relay bldgs., West Coast Relay and Radio Transmitting Station, near Davis, Spec. 2687, ENG-04-167-61-16. $1,000,000. Extended date. Plans deposit $4.20. CD 10/27.

▲† **Calif., Dixon**—FLEET BROADCAST FACILITY—BA 12/21—Dist. P. Wks. Office, 12th Naval Dist., San Bruno, fleet broadcast facility, to incl. 16,200 sq. ft. fully air-conditioned rein.-con. transmitter bldg. with bsmnt., main floor and mezzanine and associated grounding mat; two top loaded 615 ft. (640 MSL) vertical radiators with associated helix houses, grounding mats and transmission lines, 23 antennas with transmission lines, service roads to vertical radiators, etc., U. S. Naval Radio Station (T), NBy 29303, Spec. No. 29303/60. Over $1,000,000. CD 6/16.

HEAVY CONSTRUCTION—LB & CA

▲† **Diversified Builders, Inc.**, 6885 E. Rosecrans Ave., Paramount, Calif. and **Johnson Constr.**, 1725 Chicago St., Salt Lake City, Utah, CA $4,000,000, nine assembly bldgs., heating plant, 5 mi. roadway, electrical distr. utility piping sys., Hill Air Force Base, for the Air Force, OGDEN, UTAH. Boeing Airplane Co., 7755 E. Marginal Way, Seattle, Wash. CD 7/28.

▲ **ARIZONA**—State Hy. Dpt., 206 S. 17th Ave., Phoenix, Ariz.—**Martin Constr. Co.**, P.O. Box 934, Tucson, Ariz., CA $867,584, grading, select material, aggregate base, bit. stabilized base on last 0.8 mi. emulsified asphalt seal coat, beginning about 12½ mi. northeast of Globe, extending northeasterly over U. S. Rte. 60 approx. 2 mi. toward Show Low, Globe-Show Low Hy., Gila Co.;

Ariz.—**Haumont Contg. Co.**, 203 West St. Charles, Phoenix, Ariz., CA $497,091, grading, select material, bit. stabilized base, emulsified asphalt seal coat, construction 4-span steel girder bridge, beginning at Utah-Arizona State Line about 1 mi. northwest of Short Creek, extending southeasterly over new alignment of State Rte. 389, toward Fredonia approx. 4.3 mi., Short Creek-Fredonia Hy., Mohave Co.;

Ariz.—**Construction Materials Co.**, Box 2790, Tucson, Ariz., CA $313,600, placing b. conc. and emulsified asphalt seal coat, beginning approx. 36 mi. southeast of Nevada-Arizona line, extending southeasterly over U. S. Rte. 93 approx. 28¾ mi. toward Kingman, Kingman-Hoover Dam Hy., Mohave Co. Grand total $1,678,275. Bids Nov. 14, awarded Nov. 15. CD 10/25.

▲† **ARIZONA**—Bureau P. Roads, 133 Hermann St., San Francisco, Calif.,

J. **W. Jones Constr. Co.**, P. O. Box 8038, Albuquerque, N. M., CA $1,424,854, paving 23 mi. Coronado Trail, beginning Stray Horse Saddle and extending north of Campbell Blue Creek, Greenlee Co. Bids Nov. 1. CD 10/25.

▲† **Kay Cee Constr. Corp.**, 8115 North Ridgeway St., Skokie, Ill., LB $1,549,000, (3 bidders), Bldg. 40, elevated water tank, Bldg. 41, and alterations to Bldg. 2 at Veterans Administration Hospital, TUCSON, ARIZ. Veterans Admin., Munitions Bldg., Wash., D. C. Bids Nov. 22. CD 10/14.

▲† **Matt McDougall Co.**, Pittock Block, Portland, Ore. CA $1,774,495, embankment protection, Northern Pacific R.R., near Pasco, Ice Harbor Dam, WASHINGTON, U. S. Eng., City-County Airport, Walla Walla, Wash. Bids Nov. 9. CD 11/14, under LB.

▲ **Northern Pacific Railway Co.**, H. R. Peterson, ch. engr., 176 E. 5th St., St. Paul, Minn., Owner Builds $1,030,000, installing centralized traffic control 76 mi. between Spokane, Wash. and Kootenai, Idaho, WASHINGTON and IDAHO.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

rejected bids Sept. 28, superstructure 1,500 ft. toll bridge connecting San Pedro and Terminal Island, Los Angeles Harbor, Los Angeles Co. LB $11,482,000. Will re-advertise. CD 9/30, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

rejected bids Sept. 27, substructure 1,500 ft. toll bridge connecting San Pedro and Terminal Island, Los Angeles Harbor, Los Angeles Co. LB $2,576,465. Will re-advertise. CD 9/29, under LB.

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles,

Daley Corp., P.O. Box 4067, North Park Station, San Diego, Calif., CA $1,298,036, grading, surf. 4.7 mi. four lane expressway on FAS Co. Rd. 730 (Murphy Canyon Rd.) between ½ mi. and 5.2 mi. north US Hy. 80 near San Diego, San Diego Co. Bids Oct. 27. CD 11/1, under LB.

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles, Bids opened 11/17,

Jack L. Adams Corp., **Jack L. Adams & Wade G. Ellis Constr. Co.**, 45-561 Oasis St., Indio, Calif., LB $1,350,376, (10 bidders), overcrossing on future San Diego Freeway, Long Beach and Signal Hill pumping plant and roadway approaches, Los Angeles Co. CD 10/13.

▲† **Cala Constr. Co.**, Box 59, 9161 Batavia St., Orange, Calif., LB $1,189,092, est. $1,227,946, (9 bidders), earthwork pipe lines and structures, Laterals 57.9, 5.93, 60.9 and 62.9 and sublaterals, Stone Corral Irrigation Dist., Friant-Kern Canal Distribution Sys., Tulare Co. Central Valley Proj. Spec. No. DC 5421, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Madera, Calif. Bids Nov. 22. CD 10/12.

▲† **Matich Brothers & M. M. Sundt Constr. Co.**, P. O. Box 1652, Vandenburg Air Force Base, Lompoc, Calif., CA $5,228,006, (7 bidders), technical facilities, Vandenberg Air Force Base, ENG-04-353-61-15, LOMPOC, CALIF. U. S. Eng., 751 Figueroa St., Los Angeles, Calif. Bids Nov. 17. CD 9/23.

BUILDINGS—LB & CA

▲ **Christiansen Brothers, Inc.**, 209 W. 13 South, Salt Lake City 1, Utah, CA $1,474,000, three 3 story wing RESIDENCE HALLS, University of Utah, SALT LAKE CITY, UTAH. State Bldg. Bd., State Capitol, Salt Lake City 14, Utah. Bids Oct. 25, awarded Nov. 21. CD 11/2, under LB.

▲ **Paulsen Constr. Co.**, 1425 Jefferson, Salt Lake City 15, Utah, CA $1,715,135, INFORMATION CENTER and MUSEUM, SALT LAKE CITY, UTAH. Church of Jesus Christ of Latter Day Saints, 47 E. South Temple, Salt Lake City 1, Utah. Bids Nov. 4, awarded Nov. 15. CD 11/10, under LB.

▲ **U. S. Eng.**, 751 S. Figueroa St., Los Angeles, Calif., rejected bids Oct. 6, CAPEHART HOUSING, Unit 2, ENG-04-353-61-7, FORT HUACHUCA, ARIZ. LB $3,288,400. CD 10/11, under LB.

▲† **Noxon Constr. Co.**, 1513 W. Temple St., Los Angeles, Calif., CA $2,209,950, 140 units Capehart HOUSING, ENG-04-203-61-30, CAMP IRWIN, CALIF. U. S. Eng., 180 New Montgomery St., San Francisco, Calif. CD 9/6, under LB.

▲ **Campbell Constr. Co.**, 800 R St., Sacramento, Calif., CA $2,089,835, (3 bidders), Rio Linda HIGH SCHOOL, Dry Creek Rd. and I Sts., Rio Linda, DEL PASO HEIGHTS, CALIF. Grant Union High School Dist., 1400 Grand Ave., Del Paso Heights, Calif. Starks, Jozens & Nacht, 5701 Freeport Blvd., Sacramento, Calif., archts. Bids Nov. 18. CD 8/11.

▲ **Peter Kiewit Sons Corp.**, P.O. Box 748, Arcadia, Calif., CA Approx. $1,000,000, El Cortez CONVENTION CENTER, 700 Block Beech St., SAN DIEGO, CALIF. Harry Handlery, c/o El Cortez Hotel, 7 and Ash Sts., San Diego 1, Calif. Bids Oct. 24, awarded Nov. 16. CD 9/28.

▲ **University City Builders**, 3010 Cowley Way, San Diego 17, Calif., CA Est. $1,121,960, (10 year program), 68 RESIDENCES and GARAGES, University City Unit No. 1, UNIVERSITY CITY (SAN DIEGO P.O.), CALIF. University City, P.O. Box 17158, San Diego 17, Calif. Palmer & Krisel, 3602 Midway Dr., San Diego 10, Calif., archts.

Holdener Constr. Co., 2608 R St., Sacramento, Calif., LB $954,800, (4 bidders), 43,174 sq. ft. steel frame, concrete Washington SENIOR HIGH SCHOOL, Bryte, WEST SACRAMENTO, CALIF. Washington Unif. School Dist., 930 W. Acres Rd., West Sacramento, Calif. Barovetto & Thomas, 718 Alhambra Blvd., Sacramento, Calif., archts. CD 8/22/57, under Calif., Bryte.

▲ **Kemp Bros.**, 8750 Mettler St., Los Angeles, Calif., LB $2,578,000, (4 bidders), HIGH SCHOOL No. 7, WHITTIER, CALIF. Whittier School Dist., 902 West Washington Blvd., Whittier, Calif. Bids Nov. 17. CD 11/3.

▲ **Joseph E. Wilson & Archie Cottle**, Laie, Hawaii, CA $3,000,000, POLYNESIAN CENTER, LAIE, HAWAII. Church of Jesus Christ of Latter Day Saints, Mormon Temple, Laie, Hawaii. Harold W. Burton & Douglas Burton, c/o Church College of Hawaii, Laie, Hawaii, archts.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
January 4 Ontario

BUILDINGS—SLC

▲ **Ont., Brampton**—PLANT—Benson & Hedges of Canada Ltd., 1078 Pape Ave., Toronto, soon lets contract about 200x240 ft. brick, concrete, structural steel cigarette mfg. plant. $2,000,000. N. A. Armstrong, 67 Yonge St., Toronto, archt. CD 10/18.

HEAVY CONSTRUCTION—LB & CA

▲ **Tallman Constr. Co., Ltd.**, 600 Panet Rd. and **Clay Simpkins**, 629 Dudley Ave., both of Winnipeg, Man., CA $1,169,790, Bakers Narrows Airport, incl. 150x 5,000 ft. runway, parking apron, FLIN FLON, MAN. Dpt. Transport, Hunter Bldg., Ottawa, Ont. Bids Oct. 14. Awarded Nov. 15. CD 10/21, under LB.

BUILDINGS—LB & CA

▲ **Carter Constr. Co., Ltd.**, 419 Cherry St., Toronto, Ont., CA Est. $1,000,000, FLOUR MILL, PORT COLBORNE, ONT. Maple Leaf Milling Co., Ltd., Lake Shore Rd., Port Colborne, Ont. Margison & Keith, 224 Merton St., Toronto, Ont., archts. R. G. Watson Co., Ltd., 2510 Yonge St., Toronto, Ont., engrs. CD 10/18.

▲ **Willow Tree Estates**, 3089 Bathurst St., Suite 320, Toronto, Ont., Owner Builds, $1,400,000, HOUSING, TORONTO, ONT. J. Klein & Henry Sears, 71 Yorkville Ave., Toronto, Ont., archts.

▲ **Bernier & Gagne Ltee**, 460 Blvd. Boivin, Granby, Que., CA $1,250,000, SECONDARY SCHOOL, GRANBY, QUE. Catholic School Comn. of Granby, Granby, Que. Bids Nov. 17, awarded Nov. 18. CD 11/4.

U.S. POSSESSIONS

BUILDINGS—LB & CA

† **Jefferson Constr. Co.**, c/o Allen Christensen, Charlotte Amalie, St. Thomas, Virgin Islands, LB $846,894, Sugar Estates SCHOOL, Sugar Estates Rd., ST. THOMAS, VIRGIN ISLANDS. Gvt. Virgin Islands, Div. Procurement, Charlotte Amalie, St. Thomas, Virgin Islands. Bids Nov. 16. CD 10/31.

FOREIGN

HEAVY CONSTRUCTION—BA

▲ **EGYPT**—BA 1/16—Bd. Roads & Bldgs., Dpt. Communications, United Arab Republic, Cairo,

15 mi. between Port Said and el-Matariya over Lake Menzaleh. $10,000,000.

(Proposal Advertisements see pp. 120 to 122)

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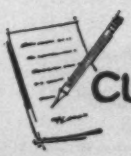

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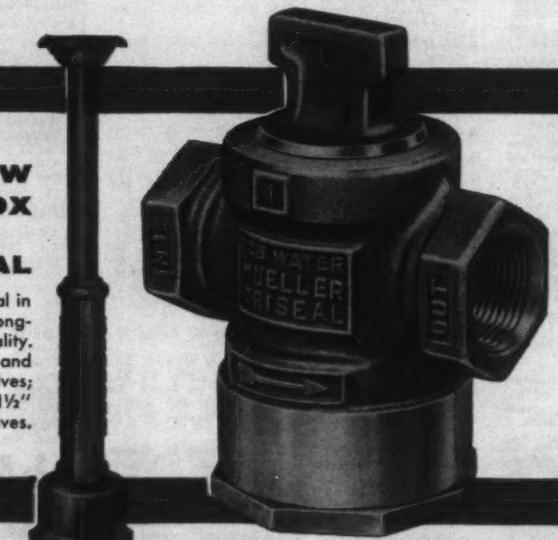
H-10385 for ¾" and 1" valves;
H-10386 for 1¼", 1½" and 2" valves.



ORISEAL CURB VALVE

Sizes ¾", 1", 1¼", 1½", 2"
H-10291—Inside I.P. Thread Inlet and Outlet
H-15176—Mueller Copper Service Pipe Connection Inlet; Inside I.P. Thread Outlet
H-15201—Mueller Copper Service Pipe Connection Inlet and Outlet

MUELLER CO.
DECATUR, ILL.

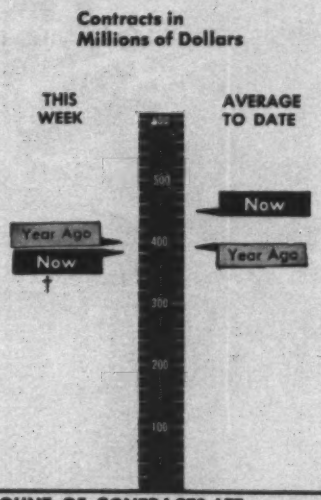
Factories at: Decatur, Chattanooga, Los Angeles
In Canada: Mueller, Limited, Sarnia, Ontario

5575

*DuPont Company registered trademark

Construction Scoreboard

This Week...



AMOUNT OF CONTRACTS LET

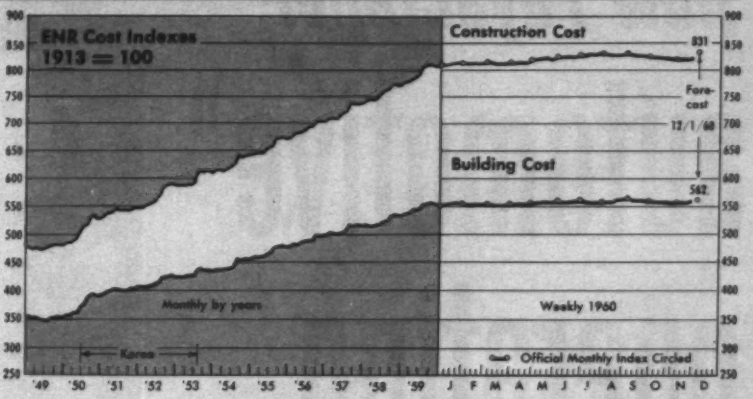
Contracts Awarded In 50 States By Type	This† Week millions	Cum. 48 wks 1960 millions	Chge '59-'60 %
All Heavy Construction	$385.0	$21,413.6	+14
By Ownership			
PRIVATE	172.7	11,490.6	+20
PUBLIC	212.3	9,923.0	+ 7
State & Municipal	173.5	7,722.3	+16
Federal	38.8	2,200.7	−15
By Type of Work			
PUBLIC			
Waterworks	5.0	428.9	+20
Sewerage	16.5	561.4	− 8
Bridges*	9.9	750.2	+41
Highways	75.2	3,178.5	+17
Earthwork, Dams & Waterways	2.0	705.2	−15
Buildings:			
Excl. Housing	52.7	2,322.6	− 4
Housing	26.3	665.9	+16
Unclassified	24.6	1,318.9	+ 5
PRIVATE			
Buildings:			
Mass Housing	61.8	5,493.7	+28
Commercial	65.2	2,398.3	+20
Industrial	41.2	2,615.7	− 6
Unclassified	4.6	974.3	+110

* Includes Private bridges. † 4-day week

NOTE Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

NEW CONSTRUCTION CAPITAL

	Week of Nov. 24 millions	Cum. 47 wks 1960 millions	Chge '59-'60 %
Corporate Securities	$ 74.6	$3,456.3	− 7
State and Municipal:			
All Except Housing	126.9	5,872.9	+10
Housing	....	199.0	+85
Federal Loans	2.8	173.9	+34
Federal Aid	....	3,228.4	− 3
Total Nonfederal	$204.4	$12,930.6	+ 3
Federal Appropriations:			
Projects in U. S.	....	3,165.6	−11
Outside U. S.	....	159.1	+610
Total New Capital	$204.4	$16,255.3	+0.4



ENR INDEXES (1913 = 100), 20-cities' average	Week of Nov. 24 1960	% Change from Oct. 27 1960	% Change from Nov. 26 1959
Construction Cost	830.66	+0.2	+2.7
Building Cost	561.28	+0.06	+1.5

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.538.

Latest Month . . .

BACKLOG OF PROPOSED HEAVY CONSTRUCTION

	October 1960 (millions)	Percent Change from last Month	Percent Change from last Year
Total U. S. (ENR reported)	$124,397	+0.5	+7.6
By Ownership—			
Private	55,980	+0.4	+11.2
State & Municipal	53,629	+0.2	+5.3
Federal	14,787	+1.9	+2.9
By Type of Work—			
Waterworks	2,909	+1.5	+3.8
Sewerage	3,986	+0.7	+8.0
Bridges	3,293	0.0	−2.6
Highways	13,552	−0.7	+7.5
Earthwork, Dams and Waterways	12,191	+1.5	+0.1
Public Buildings	22,333	+0.3	+7.1
Industrial Buildings	18,222	+0.4	+8.1
Commercial Buildings	27,189	+1.3	+18.5
Unclassified, Private	10,472*	−1.8	+0.03
Unclassified, Public	10,152	+1.8	+4.1

* Includes Private Bridges, $97 million

FLOW OF NEW PRODUCTS INTO THE BACKLOG

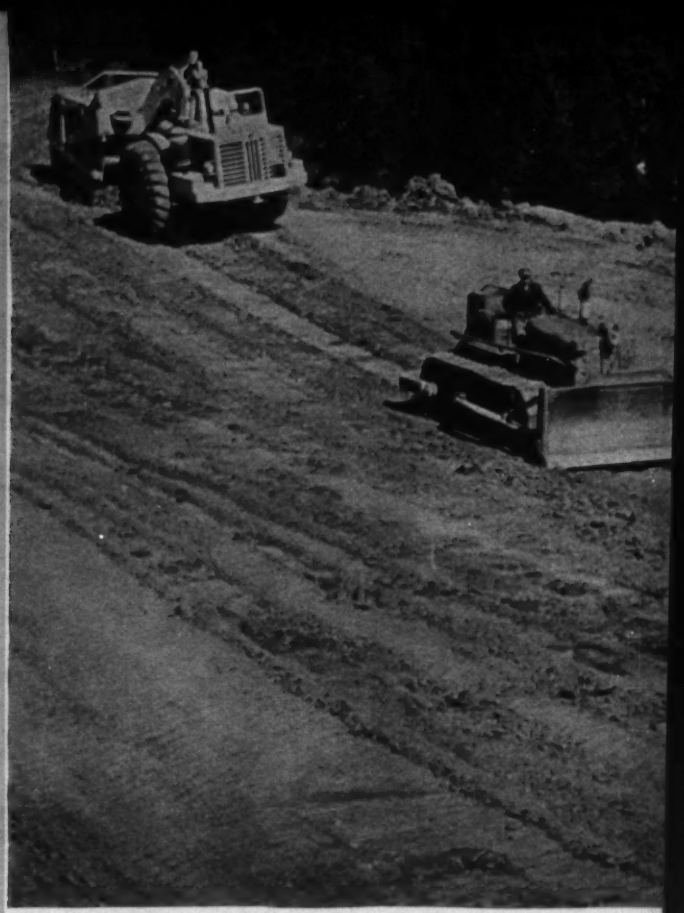
	1960 Oct. (millions)	1960 10-months (millions)	Percent Change from 1959 Oct.	Percent Change from 1959 10-Mos.
Total U. S. (ENR reported)	$1,761	$19,136	−42.8	+12.4
By Ownership—				
Private	806	10,555	−28.5	+18.2
State & Municipal	571	6,646	−29.4	+12.6
Federal	384	1,935	−66.3	−11.7
By Type of Work—				
Waterworks	59	332	−31.4	−26.9
Sewerage	58	563	−36.3	−1.8
Bridges	24	211	−64.2	−40.2
Highways	47	2,025	−68.9	+50.9
Earthwork, Dams and Waterways	217	613	−65.9	−25.7
Public Buildings	293	3,572	−48.0	+4.6
Industrial Buildings	149	2,952	−36.9	+16.2
Commercial: Mass Housing	341	4,365	−34.7	+35.6
Other Building	268	2,531	− 0.8	+13.5
Unclassified, Private	48	706**	−52.5	−25.2
Unclassified, Public	259	1,265	−26.6	+11.5

** Includes Private Bridges, $9 million

FLOW OF PROJECTS OUT OF BACKLOG INTO CONTRACTS

Total U. S. (ENR reported)	928	9,382	+26.3	+7.4
By Ownership—				
Private	466	3,798	+37.9	+15.4
State & Municipal	389	4,205	+30.5	+12.0
Federal	74	1,378	−25.3	−18.6

How Payscraper® "automotive" operating ease highballs your dirt-on-fill delivery



You won't need stunt-car "jockeys" or muscle men to give you the dirt-on-fill bonus the 375-hp International Payscraper rigs can deliver! Almost all the danger, hard work, and rump-bumping of rubber-tired rig operation is engineered out of Payscraper models. And an exclusive combination of operating ease, safety, and comfort features is engineered in!

Push-button, finger-tip ease! Your operator simply pushes a button to direct-start the DT-817 Diesel and ready 375 high-torque hp to give a cycle-speeding Payscraper rim-pull of 60,000 lbs.; plus time-saving, "no-lag" control power!

Your operator pulls directly out of 90° turns—with 34-cu. yd. heap loads on either the 2-axle "295" or 3-axle "495." Ample power and traction team with the exclusive International tandem-pump, rack-and-pinion steering to give positive, right-angle turning with full power. This finger-tip controlled system leaves the "steering feel in the steering wheel," even at the top 33.5 mph speed.

For fast, positive dumping, the high Payscraper apron lift gives you a "barn-door-like" opening up to 94 inches! The positive-acting Payscraper ejector mechanism is powered by the International shock-absorbing, planet-type Cable Control Unit. One cable drum of this simple, fast acting unit actuates apron and ejector; the other drum positions the bowl to control spreading action. Shown, the 3-axle "495" fast-dumping on the fill!

He power-shifts the Payscraper, up or down almost like easing his car into automatic drive. The 4-speed, planetary-type, torque-converter transmission gives him load-speeding *automatic* direct-drive lock-ups in second, third and fourth gears!

Your operator power-steers the 150,000-lb. loaded Payscraper with automotive-like ease. He commands the exclusive "mind-reading" International rack-and-pinion, tandem-pump steering system—plus 3-degree forward spindle pitch that improves scraper balance and prevents "bucking bronco" nose-downs in high-speed turns!

He controls 34 cu. yd. loads on hills, fills, turns—anywhere—with positive-acting Payscraper air brakes. He power-controls all Payscraper dirt-handling actions, finger-tip easy, with the International PTO-driven constant running cable control unit!

And he rides in a foam-cushioned, 15-adjustment, bucket seat that gives positive, selective ride-control to match luxury car comfort.

See for yourself what it means, in highballing your dirt-on-fill delivery, to arm your operators with Payscraper advantages. Prove what happens when you give them the highest power-to-payload punch of the 34-cu. yd. rigs—along with Payscraper operating ease and safety. Choose the 2-axle "295," or 3-axle "495" and let your International Construction Equipment Distributor demonstrate!

Up or down power-shifting—effortless power-steering—fast power control of Payscraper dirt-handling—all help your operator give you fast "kick-outs" and get full pusher hp efficiency. The highest power-to-payload punch of all 34-cu. yd. scrapers helps highball dirt delivery. The planet-powered TD-25 and TD-24 are "pushing" for this fleet of "295's"—building superhighway!

Here's the big torque converter transmission—that helps Payscraper models turn 375 turbocharged hp into industry topping production! Besides providing smooth shifting and speeds for every need, this torque converter gives automatic lockup for direct, load-speeding mechanical drive in 2nd, 3rd, and 4th gears!

International®
Construction
Equipment

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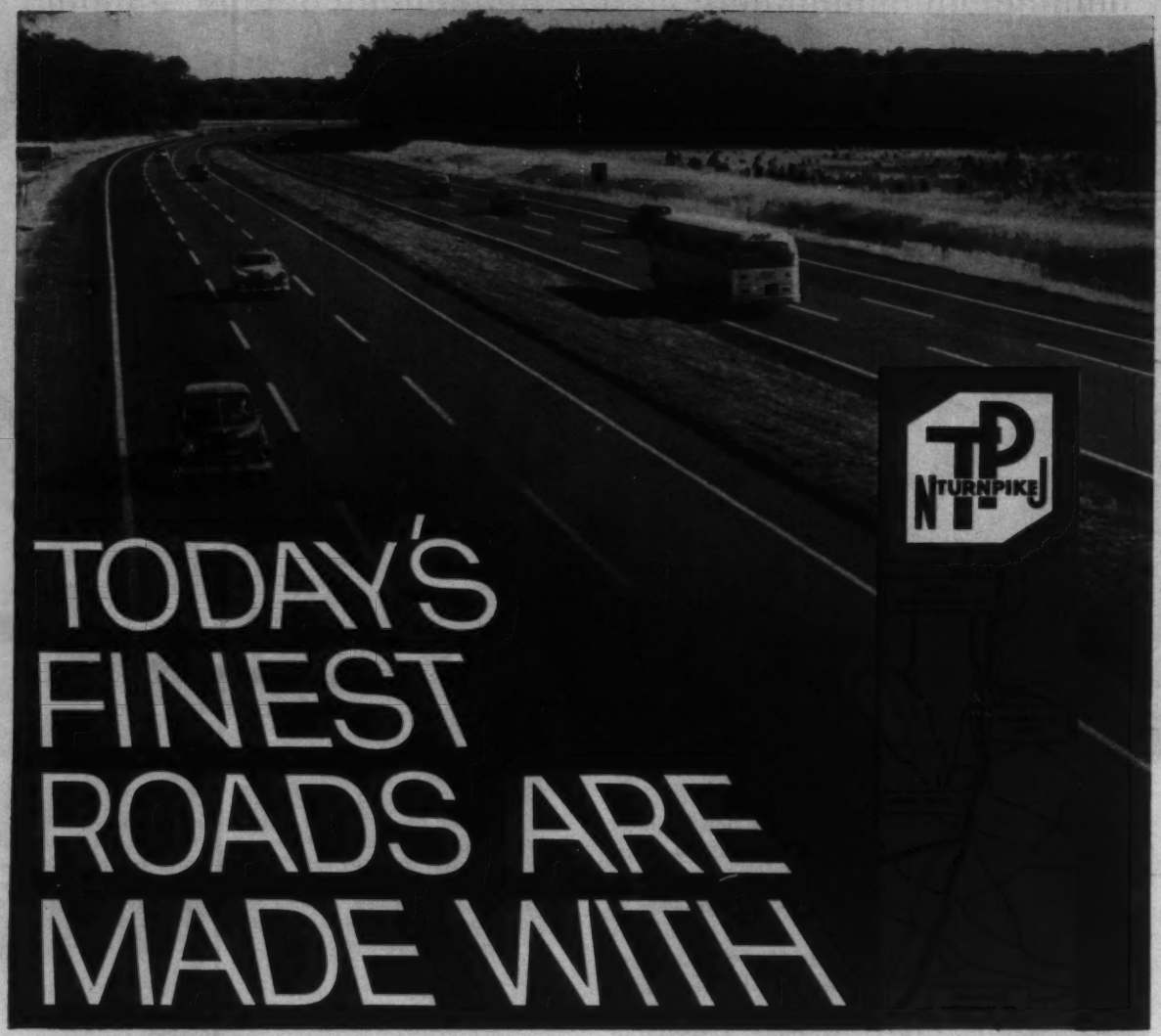
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE



TODAY'S FINEST ROADS ARE MADE WITH ASPHALT

FROM ESSO STANDARD

Asphalt furnished by Esso was used in the construction of the New Jersey Turnpike and saved more than $46,000 per mile over slab type pavement – and every year will bring added savings through lower maintenance costs. Consider these advantages in your road building plans:

Unsurpassed quality – Asphalt produced by Esso is specially refined to give pavements integral strength and flexibility – with maximum strength to resist heavy axle loads and extremes in temperature.

Faster construction time – Roads paved in ribbons are completed faster... do not require curing time, forms, and curing equipment.

Less capital tied up – Contractors can meet faster construction schedules and obtain contract payments more quickly.

Less interruption of traffic – On new construction as well as in resurfacing or widening of old roads, traffic can be routed over finished work without delay... for greater safety to workmen and motorists.

Any road, street or turnpike, paved with Asphalt costs less to build . . . costs less to maintain . . . gives a smoother, quieter ride . . . gives more miles, safety and comfort for the taxpayer's dollar over slab type pavements. For more information write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

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In Industry after Industry..."ESSO RESEARCH works wonders with oil"

Kennedy Gets $3.9-Billion Bundle

- **National Housing Conference urges appropriations for mass transportation, urban renewal, housing.**
- **Funds would allow home loans for big families, minorities, aged and urban renewal evacuees.**

Among the big spending suggestions pouring in on President-elect John F. Kennedy is a $3.9-billion bundle wrapped up by the National Housing Conference. The organization is composed of federal, state and local housing officials, urban redevelopment officials, labor union officers and representatives of religious, educational and veterans organizations.

Should the program outlined be adopted, it would apparently provide something for almost everyone.

The Conference recommends that the incoming Administration ask Congress for the following appropriations:

- $1 billion for urban renewal and redevelopment.
- $1 billion to provide low interest, long-term loans to finance housing for the aged, large families, minority groups, and families displaced by urban renewal or other public improvements.
- $1 billion to provide long-term loans for improving commuter transportation facilities.
- $400 million for the college housing program.
- $288 million for public housing.
- $200 million for technological research in housing construction and the training of officials involved in housing affairs.
- $20 million for metropolitan planning assistance.

Recommendations that would not involve federal loans and grants include:

- Establish an Office of Urban Affairs at Cabinet level.
- Extend the Federal Housing Administration's insurance program for home improvement.
- Authorize an additional $4 billion in FHA home mortgage insurance.
- Expand the scope of the activities of Federal National Mortgage Association with greater emphasis on financing of cooperative housing and redevelopment housing.

Impact on the federal budget would not be as large as the overall figures indicate, according to Francis X. Servaites, executive vice president of NHC. In the first year, the association estimates, such a program would boost the budget by $970 million. In the second year, it would hit the budget for about $1.5 billion.

Although the organization has not estimated what the program would cost beyond the second year of operation, Mr. Servaites says it would probably peak at a level above that of the second year.

The $1-billion outlay proposed for urban redevelopment would be an increase of $700 million a year above present levels.

The proposed $1 billion for housing programs to "meet the nation's unmet housing needs," would be administered by the new Cabinet-level Urban Affairs Department, Mr. Servaites says. The program would eliminate the "present crazy-quilt pattern of housing provisions" and provide for the needs of some groups that receive inadequate attention or no attention at all.

Cited as "inadequate" is the $20-million aged-housing program authorized last year and administered under the FHA's home mortgage insurance program.

"Large families" and "minority groups" are not provided for at all, the organization says. Most houses within the reach of the average family contain only three bedrooms. Long-term, low interest loans, probably larger than those now insured by FHA, would be one means of providing a large house for the large family, according to NHC.

Although "minority groups" are included in the outline of the program, "because in its entirety, the details of our program have not yet been developed," Mr. Servaites says.

The recommendation to appropriate $228 million for public housing represents an increase of $150 million above annual appropriations of recent years. The association says the increase in funds would allow construction of an additional 100,000 living units a year. Under the 1949 Housing Act, a target of 810,000 units was authorized, subject to an annual appropriation limit of $138 million.

NHC says that because costs have risen so much since 1949, the monetary limitation will permit construction of a total of only 350,000 units. Lifting the appropriations ceiling would provide the number of units set as the target.

Because of the size of the program, most of it would have to be financed initially by federal borrowing. Some of the funds, however, would be returned to the government as loans were paid off by the public and private limited profit corporations that would be established to provide some of the housing called for.

Road Bids Lower in Maryland

Contractors bidding for highway construction contracts in Maryland apparently still are caught in a competitive squeeze.

Officials of the State Roads Commission report that bids on highway projects of all types are running 8% to 10% below comparable bids a year ago. Current bids are also below cost estimates of the commission's engineers.

John B. Funk, chairman of the Roads Commission, indicates that the lower bids to some extent reflect "economic conditions." But the major reason for the lower prices is attributed to "the improvement in earthmoving techniques."

A random sampling of highway contracts over the last year showed that bids consistently have come in well below engineering estimates, Mr. Funk reports.

Here are some examples:

A project on U.S. 40 was estimated at $3.3 million. The low bid was $2.1 million.

Another job estimated at $2.1 million came in with a low bid of $1.8 million.

And a third project estimated at $1.9 million went to contract at $1.6 million.

This situation is not apparent for other types of state construction. Edwin J. Trexler, assistant to the director of public improvements, says: "We seem to be getting more bids, but they are running pretty close to estimates." He says, however, that the number of bidders for jobs in the Baltimore region now seems to be increasing, but "there has been no improvement from our standpoint on jobs in western Maryland."

Failures: Heavy Contractors Fare Best

Heavy construction contractors, although squeezed in the profit column, are not going out of business at the record rate of general building contractors and special trade contractors.

While building contractor failures edged up close to a record level and specialty contractor failures hit a 10-month record, failures among "other" (heavy construction) contractors were at a rate that indicates the number of 1960 failures will fall short of 1959's total. This is shown in the latest report on failures by Dun & Bradstreet.

The company says that failures among all contractors in October hit the second highest monthly total this year. The rise, however, was due to more failures among building contractors and special trade contractors than among "other" contractors. Building contractor bankruptcies totaled 92, special trade contractors, 127.

The October failure total for building contractors was the highest on record since 1934, when D&B started to make separate reports on contractor bankruptcies. The previous high of 91 was set in August. In the first 10 months, 825 building contractors failed. Though this is slightly under 1958's record for a 10-month period, a continuation of the failure rate in November and this month would establish 1960 as the worst year on record.

Building trade subcontractors have already set a new annual record—1,180 in the January-October period. This is 21% above last year and tops the 12-month high of 1,175 set in 1957.

Failures among "other" contractors totaled 12 in October, the same number as in September and only one more than in August of this year and October of last year. There has been a marked reduction in bankruptcies of "other" contractors during the second half of this year—the monthly average dropping from about 15 in the January-June period to about 10 a month in the July-October period. And the 10-month total of 129 is slightly under last year's high of 133 for the same period, and will probably remain below 1959 when the 12-month total is in. However, this year's 10-month total exceeds the 12-month totals for all other post-World War II years up to 1959.

The indicated lower rate of failures for all of 1960 can be attributed to sharp increases this year in highways, bridges, waterworks, pipelines and missile bases.

Liabilities of failing contractors rose for all groups in October. General building contractors' liabilities jumped 34% to $11.2 million. Average liabilities per builder rose to $108,250 in the first 10 months. This is the first year that the average has gone above $100,000. The previous high was $88,220 for the 12 months of 1959.

Liabilities of bankrupt trade subcontractors rose to $5.5 million. This pushed the 10-month total to $56.5 million, 64% higher than the previous record, set in 1959. Average liabilities per failing sub have jumped to a 10-month average of $47,900 this year, compared with a high of $39,800 for the full year of 1956, and last year's $36,660.

"Other" contractors failing in October had total liabilities of $1.2 million, the highest in three months. The 10-month total of $10.7 million is above the old record set in 1958 and 19% above last year. But liabilities per failure averaged $83,350 in the first 10 months, which is about 7% less than the average for all of 1959 and 11% below the record average of 1958.

Business in Brief...

• **Bid openings**—California's Division of Highways has called for bids on two highway projects worth about $23.3 million. First opening will be December 22 in Los Angeles. Contract will be for construction of 4.2 miles of four-lane road for the Newport Freeway in Orange County. Eleven traffic separation structures and bridges are included in the project. Available for the job is $9.2 million. Second opening will be January 5, also in Los Angeles. Job is 6 miles of eight-lane freeway, for which $14 million is available.

• **Contractor sues state**—Farina Brothers Co., Inc. of Newton, Mass., is suing the Commonwealth of Massachusetts for $1 million. The company charges the state delayed a start of work for eight months after Farina won a $5-million contract for the elimination of railroad grade crossing at Salem.

• **Corps plans**—The North Pacific Division of the Corps of Engineers will award Air Force and Army construction contracts totaling $100 million during the 1961 fiscal year. The division takes in Oregon, Washington, Idaho, Montana and Alaska.

• **Patent upheld**—The U. S. District Court at Charlotte, N. C. has upheld validity of basic patents held by Power Curbers, Inc., Salisbury, N. C., on its curbing machine. Power Curbers brought the patent infringement action against E. D. Etnyre & Co., Everett, Mass., and A. E. Finley & Associates, Inc., Raleigh, N. C., distributor for the Etnyre Co.

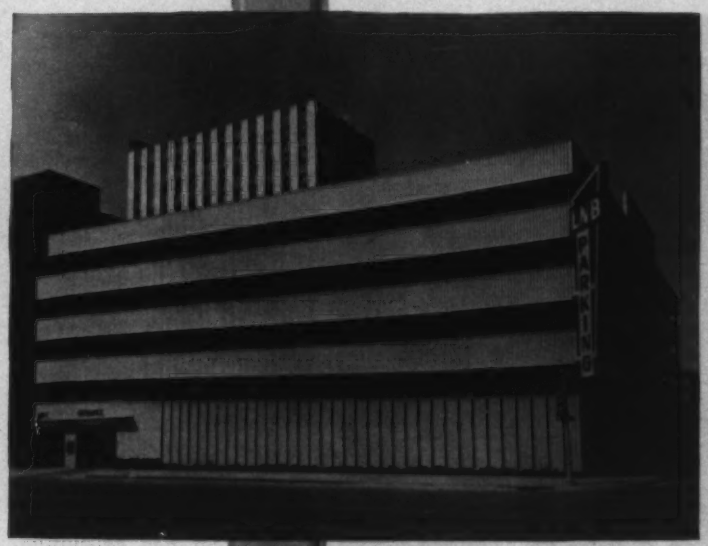
• **First of 20**—Work has started on the first of 20 buildings that will comprise a $30-million industrial part in Madison Township, N. J. The development, to be known as Golden Circle Industrial Park, is a venture of Marshall and Raymond Sachs, both of New Brunswick N. J., and Bernard Okin of Brooklyn, N. Y.

• **Contractor licensing**—Florida's construction industry will ask the state legislature to pass a licensing law for general and specialty contractors. The state license would be a prerequisite to obtaining licenses now issued by several counties and municipalities. Contractor licensing legislation also will be requested next year in Wyoming and Washington (ENR Nov. 17, p. 150).

• **Expensive atoms**—University of California will start a $9.6-million renovation project at its $6.2-billion electron volt betatron at Berkeley next spring.

• **Spending for space**—Lockheed Corp. will spend $4 million for expansion of its Missiles and Space Division plant at Sunnyvale, Calif. Work will start on a 172,800-sq-ft engineering and laboratory building in January.

• **Steel for Canada**—Construction of a $40-million rolling mill near Montreal is expected to start next spring. The plant will be part of Dominion Steel & Coal Corp.'s expansion program, which will cost about $140 million.



From pavement to paying space in only five months ...with STEEL

STEEL pays off sooner.

Take the case of the 5½ deck, 262-car parking facility built by the Lubbock National Bank in Texas, for example.

Steelwork was completed in just 16 working days, and only five months after construction started, cars began to roll in. This is *three months faster* than a nearby parking deck constructed of concrete.

Here's what this meant to the owner in additional income — income which could *never* have been realized if the parking deck had not been ready three months earlier.

Extra rental income for the owner:

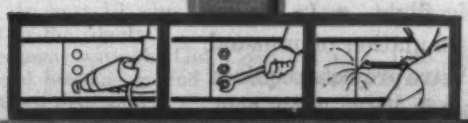
1 month earlier completion — $4490

2 months earlier completion — $8980

3 months earlier completion — $13,470

Building with steel always pays off—and not just in income. Steel's other payoffs include lower construction costs and larger clear-span areas.

American Institute of Steel Construction
101 Park Avenue, New York 17, N.Y.



Steel **STANDS** *for the future* AISC

INSTANT FLIGHT

Varied stresses of programmed flight will soon be duplicated at ground-level. A $10 million static test facility, designed by Vitro for the U.S. Air Force, will shortly begin operations at Wright-Patterson. Here, major components will be subjected to programmed aero-dynamic heating and dynamic loading of supersonic flight. ■ In eleven major Vitro projects, the precise simulation of unusual environment was vital; twenty-one Vitro projects required design of nuclear containment. This is Vitro know-how.

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Trouble Shooters Aim at Costs

Thanks to the efforts of construction management and labor, the mention of two Louisiana cities—Lake Charles and Baton Rouge—no longer brings a sense of acute discomfort and foreboding to contractors and construction workers familiar with the big construction market potential of the rich Gulf Coast area.

Two years of joint work on a unique and resourceful trouble-shooting program have provided the means for removing an accumulation of costly labor practices that has rubbed clients and potential customers the wrong way. Today, some of the area's large industrial concerns are moving ahead again with construction work after what amounted to a sit-down strike on their part against the construction industry.

The program was designed to create construction jobs for contractors and workers by giving customers more value for the dollars they spend. It is the work of the international building trades unions, national contractors, local unions and local contractors.

Representatives of local and national contractors hope to organize soon in New Orleans the fifth in a series of geographically scattered, joint committees whose job it is to assure labor conditions conducive to more capital investment.

The program is already in operation in Baton Rouge and Lake Charles, and in Beaumont and Houston, Texas. Agreement has been reached between management and labor in each of the areas on a number of labor principles and objectives that are expected to reduce construction costs.

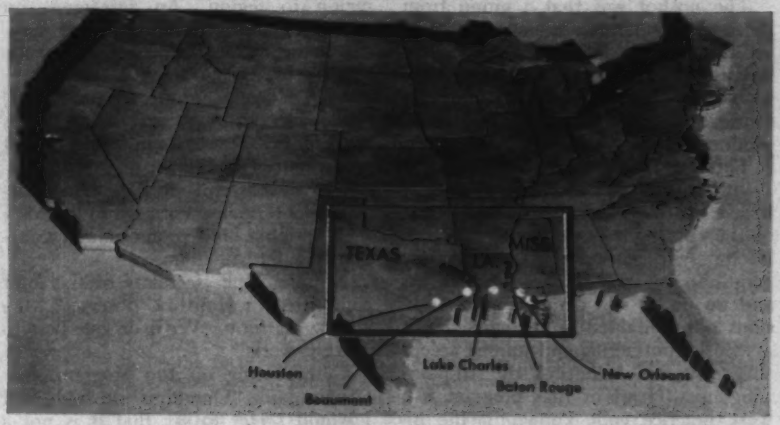
High on the list of objectives is the elimination of work stoppages and wasteful work practices.

The Labor Cost Committee of the National Constructors Association, which pioneered the program, now confidently predicts that the Gulf Coast area will experience more industrial construction activity in the chemical, petrochemical and refinery field during the next 10 years than any other area in the country.

In many ways, the Gulf Coast was a natural breeding ground for the labor troubles that arose.

Mild in climate, it is richly endowed with deposits of oil, salt, sulphur and limestone, and has natural access to fresh and salt water transportation routes. Along its shores have sprung up vast industrial complexes, including the greatest concentration of oil and interrelated chemical plants in the nation.

To lure more work like this plant of Petroleum Chemicals, Inc . . .



. . . joint committees are cutting labor costs on the Gulf Coast.

The volume of industrial construction in Texas and Louisiana hit $543.9 million in 1956. At one point, as many as 12 big national contractors were working in the area simultaneously. The resulting pressures and the scarcity of top-notch workers bred labor practices that grew up outside of existing labor contracts and that were hard to control.

Late starts, early quittings, on-the-job coffee making, jurisdictional strikes and "gold bricking" were some of the problems that eroded the value of the construction dollar.

No one segment of the industry has been blamed for these developments. A spokesman for one of the big industrialists in the area says the owners themselves shared the responsibility "because owners were primarily interested in completion dates and thus gave in to union practices that sent costs soaring."

The bubble began to burst a few years ago. By the end of 1958, the volume of industrial construction in the two states had fallen to $205.6 million.

The industrial clients themselves precipitated corrective action—and it began in Baton Rouge. There, they formed a united front and ordered the shutdown of their jobs until the situation improved.

The national contractors, working through the National Constructors Association, asked the general presidents of the AFL-CIO building trades unions to join them in an effort to solve the problem. A meeting was held in Baton

. . . The new approach to labor problems is paying dividends

Rouge. And an agreement was reached under which the local unions would no longer seek contractor recognition of various work practices and conditions not written into their local labor contracts.

Later, representatives of several industrial clients joined members of NCA's Labor Cost Committee in a discussion of Lake Charles labor problems at an Executive Council meeting of the AFL-CIO Building and Construction Trades Department in Miami. That was in February, 1959. The clients' story was simple: "We need additional facilities. We have the money to spend. But we are not willing to spend it under present conditions." Among those that supported the appeal for improvement were Continental Oil Co., Phillips Petroleum, Cities Service and Olin Mathieson Chemical Corp.

The upshot was that a group from the international unions and from NCA sat down with local contractors and unions in Lake Charles and worked out a four-way agreement of principles to improve labor relations and to increase productivity.

This was the agreement:

"All parties stipulate their agreement to live up to the letter of all the terms of the applicable agreements. No contractor will request or demand any condition contrary to these agreements and no union will demand any conditions not contained in the agreements.

"Both contractors and unions accept the spirit and intent of the 10-point program. (Heart of that program is a work practice code known in the industry as the "Ten Commandments.")

"This Labor-Management committee will meet in sixty (60) days and hear any complaints as to violation of the spirit of this understanding. It is hoped this display of cooperation by contractors and unions will stabilize the construction industry labor problems and convey to the owners security in the future development in the Lake Charles area."

Since then, the program has been extended, at the request of local labor and management, to Beaumont and Houston.

In each of the areas, including Baton Rouge, a formal joint committee was established, equally representing the NCA, international unions, local unions and local contractors.

Organizational spadework for the committees was done by Frank Bonadio, secretary-treasurer of the AFL-CIO Building and Construction Trades Department; T. Lawrence Cronin, chairman of the NCA Regional Labor Committee for the Gulf Coast area and director of construction personnel and labor relations for The Lummus Co.; and John F. O'Connell, vice president of Bechtel Corp., who was chairman of the NCA Labor Cost Committee at that time.

Mr. Bonadio has served as labor chairman of each regional committee. The contractor chairmen—different for each committee—have come from the ranks of NCA.

Representatives of industrial clients attended the organization meeting of each committee and explained their interest in the enterprise.

Meetings have been held at 60-day intervals and have been thrown open to the public at the conclusion of the committees' executive sessions. The problems discussed have varied from region to region. An agreement on principles, outlining an approach similar to the Lake Charles one, has been reached in all four areas.

The Houston group, for example, adopted a six-point set of objectives last month. The goals include: prompt settlement of local labor disputes, elimination of wasteful work practices, development of apprentice and journeymen training, and promotion of cooperative safety programs.

Norman Huff, secretary of the joint committee in Houston, observed: "It's a lofty platform. We'll do our best to make it work."

Commenting on the program, Mr. Cronin said: "Our aims are high, but I would prefer to say that it is not a lofty but a 'positive' program, since the four-way participators in each area are working toward a common goal—to lure more new business.

"The national contractors and international unions, who confer frequently and periodically in each of the various areas, are continually being made aware of specific local problems, approaches and solutions. They, in turn, act as a communications clearing center—transmitting these accomplishments, problems, ideas, etc. of each area to all others."

How successful has the program been?

Although some feel that the volume of work has been too small and the time too short to provide an acid test in every area, there is no doubt about the fact that the program is paying dividends.

Continental Oil Co., for example, had delayed construction of its new $10-million plant in Lake Charles for the production of industrial alcohol from petroleum until the labor situation improved. Satisfied with the assurance of improvement, it went ahead with the project, and The Lummus Co. now expects to have the plant completed next summer. Construction volume in the Beaumont area has picked up considerably and is expected to total more than $125 million this year and next.

Looking back on the program, a CONOCO spokesman said: "We are quite happy with what has been done." He called the present situation a "great improvement" but warned of the need of "continued cooperation" to preserve and improve the gains that already have been made.

As in so many other joint efforts of the industry, the ultimate success of this one, too, depends on the implementation of understandings and agreements reached.

Sponsors of the program are satisfied, at least, with the changes they have produced in the labor relations climate and in the approach to labor problems.

Meeting on September 21, the Lake Charles committee, for instance, evaluated its progress and reached these conclusions:

- It has "practically eliminated" work stoppages and "non-essential restrictive work practices."
- It has provided forums for the discussion of mutual problems, and established procedures to insure prompt settlement of local labor disputes.
- It has promoted cooperative safety programs and the training of apprentices and journeymen.
- It has developed "clear understandings of contractors' responsibilities to the unions and the unions' responsibilities to the contractors, as well as their mutual obligations to the clients and the public."

In fact, the programs in Beaumont, Baton Rouge and Lake Charles appear to be so well established that the national contractor and international union representatives see no need to attend future committee meetings in those areas unless and until the local contractors and unions call them back in.

One of the most valuable aspects of the program, perhaps, is its development of improved communications between contractors and unions at the national and local levels. And out of this there may eventually come a new trouble-shooting program that can be used on a nationwide scale.

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Labor in Brief . . .

• **Elevator strike continues**—A strike by elevator constructors in New York City went into its seventeenth week on Monday after union members rejected a tentative settlement that would have increased their wages by 75 cents an hour over a three-year period. The strike began August 1.

• **Advice to sheet metal workers**—Edward Carlough, president of the sheet metal workers union, has spelled out a number of "musts" for his union in the days ahead. Among them: "Renewed efforts" to increase membership, with emphasis on the production field; "vigorous" action, particularly at the local level, to protect jurisdiction; more legislative and political action.

• **Right to work**—The introduction of bills outlawing the union shop can be expected in many state legislatures next year, according to the National Right to Work Committee. It says right to work supporters won election victories "in virtually every state where voluntary unionism was an issue."

• **Moonlighting**—A shorter workweek, which may become four days by 1970, should mark a further increase in moonlighting, according to Ohio State University instructor A. C. Filley. Writing for the American Management Association, Mr. Filley says current patterns show that the need for additional income prevents enjoyment of the leisure shorter working hours produce.

• **Prevailing wages**—Kentucky's new prevailing wage law, which makes union scales a heavy factor in wage determinations, has lost another round. A state court has made permanent an injunction it issued earlier preventing the state from setting wages for Hopkins County school construction. Reason: Not enough union contracts in the area to afford a "reasonable basis" for wage determinations under the law.

• **Hot cargo**—The question of whether a union can strike for a labor contract clause giving members the right to refuse to handle nonunion or struck work is now before the National Labor Relations Board.

Ruling Limits Wage-Hour Law

Labor Secretary James P. Mitchell has lost another case in his effort to extend the reach of the minimum wage and overtime provisions of the Fair Labor Standards Act.

An appeals court has ruled that a contractor was not required to pay overtime after 40 hours to construction workers on a tunnel that became a part of the Chicago water system.

The application of the law has been a guessing game for contractors ever since the Supreme Court ruled, in the Vollmer case, that the law must be liberally applied. Workers engaged in commerce or in the production of goods for commerce are entitled to the law's protection. Under present law, coverage must be determined by "practical considerations, not by technical conceptions."

The Chicago case is a good example of the uncertainty that follows.

The Labor Department contended that the workers were engaged in commerce because some of the water that would later flow through the tunnel would be used by companies engaged in the production of goods for commerce. It was admitted that industrial concerns account for only one-third of the city's water consumption.

The Seventh Circuit Court of Appeals said this was stretching the point too far. The tunnel work done by S. A. Healy Co. was neither "closely related" to nor "directly essential" to production of goods for commerce, it concluded.

The court reasoned that the tunnel itself was not a facility of commerce and it was not a facility for the production of goods for commerce. It was not designed for the use of concerns in commerce and it would not be operated exclusively, or even primarily, for their use. The construction work was therefore too remote from commerce to make the law apply.

The decision still leaves in effect the Labor Department's general rule of thumb, which is this: The law "covers not only construction work physically in or on a channel or instrumentality of interstate commerce but also construction work so directly and vitally related to the functioning of an instrumentality or facility of interstate commerce as to be, in practical effect a part of it, rather than isolated, local activity."

Tunnel Explosion

Accident in California reveals union discord

Contractors involved in a tunnel explosion on the South Fork Water and Power Project in northern California's Butte County may find themselves in the middle of an internal conflict in the laborers union.

The explosion killed one man and injured seven. It occurred early Saturday morning, November 12.

The Tunnel and Rock Workers of America, which is an embryo union organization that claims to represent 1,700 tunnel workers, charged in a telegram to Gov. Edmund G. Brown that the explosion resulted from contractor violation of safety orders. It said the explosion occurred in an electrical storm, during which blasting operations are prohibited by state regulation.

Claiming that this is "not the first violation" of state safety regulations on the job, the union told the governor that it had "repeatedly informed" officials of laborers Local 185 of the violations. It accused the officials of failing "in every instance" to take any action against the contractors that would provide members the safety and protection "that is every working man's due."

Some tunnel and rock workers in the area have been at odds with their parent laborers union for some time. The secession leaders claim to have followers in California, Nevada, Oregon, Washington, Arizona, and New Mexico.

An investigation of the tunnel explosion was started last week at Governor Brown's direction.

A spokesman for the joint venture working on the tunnel said the electrical storm referred to by the union had abated "a few hours before the blast." He claimed that a safety engineer was on the job at the time of the blast and that there was no way for him to anticipate the explosion.

Court Dismisses Lawsuit To Upset a Pension Plan

The Landrum-Griffin labor law's "bill of rights" does not give union members the right to upset properly negotiated labor contracts.

That ruling occurred in a suit filed by eight carpenters against their district council and three western chapters of Associated General Contractors to void a pension plan.

Those who negotiated the plan were duly authorized to do so and it would be "very damaging" to set aside the bargain they made, the court said.

OFFICIAL PROPOSALS

Bids: December 9, 1960

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time on the 9th day of December 1960, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, N. F. Ronan, Asst. District Engineer, 353 Broadway, Albany 1, New York						
Albany (Rte. 43)	R.C. 60-193	Normanskill Viaduct, S.H. 9109 Delaware, Pt. 2, S.H. 41	1.42	Asphalt Concrete	$34,000 Plans $5	$632,000
Albany (Rte. 155)	PSC 18537	Elimination of the Grade Crossing of Shakers-Watervliet, S.H. 879 and the Delaware and Hudson Railroad	0.61	9" Cem. Conc. Pavt. = 0.57 Mi.; Misc. Work = 0.04 Mi.; RRGS Comp. I-Beam & Plate Girder 11 Spa, 860' Total; Gate House & Fencing	$42,000 Plans $5	760,000
Greene (Rte. 81)	R.C. 60-186	Greenville-Coxsackie, Pt. 2, S.H. 719; Greenville-Coxsackie, Pt. 3, S.H. 1365	4.41	Asphalt Concrete Twin 15' Open Box	$46,000 Plans $5	828,000
Schenectady (Int. Trg. Rte. 890)	FIC 60-18 FISH 60-9	Interstate Rte. Conn. 550 (Michigan Ave. to Schenectady Crosstown Conn., Pt. 1) Project I-890-5(16)	1.41 (2.04 Acc.)	9" Cem. Conc. Pavt., 2 @ 38'; Var.= 1.22 Mi.; Misc. Work = 0.19 Mi.; Access = 1.86 Mi. Cem. Conc. Pavt. & 0.33 Mi. Asph. Concrete; 3 HGS Comp. I-Beam, 4 Spa. 216.5' Tot., 4 Spa. 195.2' Tot.; 4 Spa. 179.5' Tot.; Ped. Underpass Enclosed Box	$160,000 Plans $5	2,900,000
DISTRICT No. 2, L. Ketchum, District Engineer, 109 No. Genesee Street, Utica 1, New York						
Montgomery (Rte. 5)	FAC 60-29 FARC 60-194	Mohawk River Turnpike, Amsterdam-Tribes Hill, S. H. 108, City of Amsterdam, East-West Art. Highway Project F-U-349(15)	2.26	9" Cem. Conc. Pavt., 2 @ 24' Var.= 2.10 Mi.; Asph. Conc.= 0.16 Mi.; Precast Conc. Beam 1 Sp. 31.8'	$72,000 Plans $5	1,314,000
Oneida (Rte. 12)	R.C. 60-163	Marcy Hill-Trenton, S.H. 931	3.60	Asphalt Conc. Type 2A, Incl. Repairs to Bridge No. 1	$16,000 Plans $5	291,000
DISTRICT No. 3, E. E. Towlson, District Engineer, 333 E. Washington St., Syracuse, New York						
Onondaga (Rte. 48)	R.C. 60-185	Baldwinsville-State Fair Grounds, S.H. 8496	2.33	Asphalt Concrete, Type 1A	$1,800 Plans $5	33,000
Onondaga	FAC 60-28	City of Syracuse: West St.-Herald Place Art. Hwy. Project U-446(9)	1.17	Demolition of Buildings	$19,000 Plans $5	341,000
Wayne (Rte. 21)	R.C. 60-190	Palmyra-Marion, S.H. 1714, Marion-Williamson, Pt. 1, S.H. 992	7.16 (1.48 Acc.)	Asph. Conc. Type 1A = 8.64 Mi.; Comp. WF Truss Bridge; 3 Spa. 324' Total	$95,000 Plans $5	1,725,000
DISTRICT No. 4; B. F. Perry, District Engineer, Barge Canal Terminal, Rochester 1, New York						
Livingston	FASS 60-19	Nunda-Dansville, Pt. 2, Co. Rd. Project S-501(3)	5.61	Top Course Bit. Mac. (Asph. Emulsion) = 5.58 Mi. Misc. Work = 0.03 Mi.	$46,000 Plans $5	824,000
Monroe	FISH 60-13 FAC 60-26	Interstate Rte. Conn. 580 Rochester Western Expressway (Howard Road to Rochester City Line) Rochester Outer Loop (Chili Ave. to Lyell Ave.) Project I-490-2(20); U-UG-1093(9)	1.79 (5.20 Acc.)	9" Reinf. Conc. Pavt., 2 @ 24' Var.= 1.79 Mi.; Acc.= 3.77 Mi. Cem. Conc. Pavt. & 1.43 Mi. Asph. Concrete 1 HGS-Prestress. Conc. Beam Br. 4 Spa., 193' Tot. 6 HGS Comp. I-Beam Brs., 3 Spa. 131.5' Tot.; 3 Spa., 126.5' Tot.; 3 Spa. 148' Tot.; 3 Spa. 203.8' Tot.; 4 Spa. 206.5' Tot.; 4 Spa. 217.5' Tot.; 4 HGS Comp. Pl. Gird. Brs. 3 Spa. 281.3' Tot.; 3 Spa. 269.1' Tot.; 1 Sp. 150'; 1 Sp. 150'; 1 RRGS Thru Pl. Gird. Br. 2 Spa., 144' Tot.	$350,000 Plans $10	6,179,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Cattaraugus	FAC 60-13	City of Olean: East-West Art. Hwy. (East State Street: Union Street to Barry Street) Project U-141(6)	0.14	Asphalt Concrete Type 2A = 0.09 Mi. Misc. Work = 0.05 Mi.	$4,500 Plans $5	80,000
DISTRICT No. 7, R. W. Sweet, District Engineer, 444 Van Duzee Street, Watertown, New York						
Clinton (Int. Trg.) Rte. 87)	FISH 60-15	Interstate Rte. 502, Sections 7C-11 and 7C-12 (Moffitt Rd. to Stratton Rd.) Project I-87-4(10)	6.19 (1.04 Acc.)	Asphalt Concrete Type 1A; HGS Prestressed Conc. Beam 7 Spa. 352.6' Total	$195,000 Plans $5	3,565,000
Clinton (Int. Trg. Rte. 87)	FISH 60-14	Interstate Route 502, Sections 7C-2 and 7C-3 (Stratton Rd. to Miner Farm Rd.) Project I-IG-87-4(9)	5.44 (2.51 Acc.)	Asph. Conc. Ty. 1A = 7.76 Mi.; Misc. Work = 0.19 Mi.; 4 HGS Prestress. Conc. Beam; 6 Spa. 320' Tot.; 3 Spa. 178' Tot.; 3 Spa. 152' Tot., 6 Spa. 314' Tot.; 1 Br. Reinf. Conc. Box 2 Spa. 15' Ea.; 1 Br. Reinf. Conc. Open Box 2 Spa. 15' Ea.; 2 RRGS Prestress. Conc. Beam; 3 Spa. 133' Tot., 3 Spa. 133' Tot.	$255,000 Plans $10	5,022,000
Jefferson (Rte. 11)	R.C. 60-189	Watertown-Philadelphia, Pt. 1-C, S.H. 5681; Watertown-Philadelphia, Pt. 2, S.H. 5617	3.66	Asph. Conc. Ty. 1A = 3.60 Mi.; Misc Work = 0.06 Mi.; RRGS-Comp. WF Beam, 1 Sp. 82'	$110,000 Plans $5	2,000,000
Lewis (Rte. 26)	R.C. 60-188	West Leyden-Constableville, Pt. 2, S.H. 8188; Constableville-Lyons Falls, Pt. 1, S.H. 1600	1.62	Asphalt Conc. Ty. 1A Comp. I-Beam Br. 2 Spa. 124.1' Total	$35,000 Plans $5	609,000
DISTRICT No. 8, K. G. Rauer, District Engineer, Pleasant Valley Rd., Poughkeepsie, New York						
Dutchess (Rte. 22, 55)	FARC 60-110	Billings-Poughquag, S.H. 8825, Stonehouse-Stormville, S.H. 1162, Stonehouse-Pawling, S.H. 1677, Pawling-Patterson, S.H. 343, Pawling Village, S.H. 5009 Project F-1025(3); F-FG-625(5); F-350(23)	8.23 (0.57 Acc.)	Asph. Conc.= 7.63 Mi.; 9" Cem. Conc. Pavt. 2 @ 24' = 1.17 Mi. Bridge-Reinf. Conc. Box 20.8' Span RRGS-NYCRR Prestress. Conc. Beam-3 Spans 139.4' Total; HGS-Comp. I-Beam, 4 Spans, 200.2' Total	$230,000 Plans $5	4,170,000
Dutchess	FAC 60-27	Poughkeepsie; North-South Art. Project U-322(19)	2.61	Demolition of Buildings	$4,600 Plans $5	84,000
DISTRICT No. 9, J. C. Frederick, District Engineer, 71 Frederick Street, Binghamton, New York						
Delaware (Rte. 17)	R.C. 60-187	East Branch-Sullivan Co. Line, Pt. 1, S.H. 5383A; Hancock-East Branch, Pt. 2, S.H. 5246; Hancock-East Branch, Pt. 1, S.H. 5456	7.36 (4.36 Acc.)	9" Cem. Conc. Pavt. 2 @ 24' = 7.36 Mi.; Access = 1.85 Mi. Cem. Conc. Pavt.; 2.31 Mi. Asph. Conc. Pavt. & 0.20 Mi. Fdn. Crse. Gran. Mat. Type A; 3 Brs. Reinf. Conc. Boxes, 23.2', 24.4', 20.4' Skew Spans; 1 Br. Comp. Haunched Gird. & Beam, 5 Spa. 576' Tot.; 6 Brs. Comp. Beam, 3 Spa. 165' Tot.; 4 Spa. 359' Tot.; 9 Spa. 711' Tot.; 5 Spa. 518' Tot.; 1 Sp. 64'; 4 Spa. 165' Tot.; 1 Br. Reinf. Conc. Rig. Fr., 1 Sp. 50.3'	$540,000 Plans $10	11,600,000
Sullivan (Rte. 17)	R.C. 60-176	Liberty-County Line, Pt. 2, S.H. 5234	0.18	Asph. Conc. Type 1A Comp. I-Beam Bridge 113' Span	$12,000 Plans $5	217,000
DISTRICT No. 10, A. M. Sarr, District Engineer, 325 W. Main Street, Babylon, New York						
Bronx (Int. Trg. Rte. 95)	FICBE 60-5	Interstate Rte. Conn. 511 Cross Bronx Expressway-Cont. 2A (Major Deegan Expressway Interchange) (Undercliff Ave. to Plimpton Ave.) Project EI-95-1(47)	0.18	Cement Conc. Pavt. with Carbon Black; 3 HGS-Rig. Fr., 3 Spa. 186.6' Tot., 2 Spa. 107.1' Tot., 1 Sp. 36.7' Tot., 1 HGS Comp. Beam 1 Sp. 170.2'; 1 HGS Comp. Beam, 4 Spa. 267.6' Tot. & 1 Sp. Conc. Slab 48'; 1 HGS Pl. Gird. 1 Sp. 209'	$421,000 Plans $10	7,652,000
Kings (Int. Trg. Rte. 278)	FIGE 60-3	Interstate Rte. Conn. 512 Gowanus Expressway, Cont. 2 (Hamilton Ave: Clinton St. to Second Ave.) Project EI-278-1(54)15	0.61 (0.57 Acc.)	7½" Reinf. Conc. Slab Roadway (on Viaduct) = 0.56 Mi.; Misc. Work = 0.05 Mi., Sheet Asph. Pavt. (Street Repairs) = 0.57 Mi.; Widen and Strengthen Exist. Elevated Steel Structure, 33 Spa.= 2,946' Total	$600,000 Plans $5	1,083,000
Kings	FAPETS 60-1	Prospect Expressway: Fort Hamilton Parkway Interch. (Greenwood Ave. to Beverly Rd. FAPE 59-1) Project U-1081(6)	0.54	Traffic Signs	$2,500 Plans $5	46,000
Nassau (Rte. 27)	FARC 60-191	Conduit Boulevard-Cont. 4, S.H. 5701A, Pt. 5, (Beech St. To Unqua Road) Project U-947(23)	3.85	Cem. Conc. Pavt. with Carb. Black = ½ of 2.74 Mi. Asph. Conc.= ½ of 2.74 Mi.+ 1.02 Mi., Misc. Work = 0.09 Mi.	$150,000 Plans $5	2,733,000
Nassau (Rte. 24)	FALIE 60-4	Long Island Expressway, Cont. 3, (Guinea Woods Road to Jericho Turnpike) Project U-862(29)	4.45 (5.08 Acc.)	Landscaping; Traffic Signs; Delineators	$13,000 Plans $5	237,000
Nassau (Rte. 24)	FALIETS 60-5	Long Island Expressway-Cont. 5, (Jericho Turnpike to South Oyster Bay Road) Project U-862(30)	3.39 (5.99 Acc.)	Traffic Signs	$5,000 Plans $5	93,000
Nassau (Rte. 107)	R.C. 60-192	Massapequa-Glen Cove, S.H. 9017, (Merrick Road to Hempstead Turnpike)	4.10	Asphalt Concrete Pavt.	$46,000 Plans $5	841,000
Suffolk	HSPTS 60-2	Heckscher State Parkway, Cont. No. 4, Sunrise Highway to Heckscher State Park	6.27 (4.43 Acc.)	Traffic Signs	$2,500 Plans $5	45,000
Nassau & Suffolk	OP 60-1	Ocean Parkway (Tobay Beach to Gilgo State Park)	3.83	Highway Slope Protection	$35,000 Plans $5	665,500

(Continued on the following page)

OFFICIAL PROPOSALS

(Continued from preceding page)

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

If the deposit is $10.00 or more, full refund for one copy of the plans and specifications will be made to a bidder for the particular project, if such plans and specifications are returned in good condition within 30 days after the award of the contract or after the rejection of the proposal. The successful bidder is not required to return the copy of the plans and specifications in order to be entitled to such refund. If the deposit is $10.00 or more, partial refund will be made for the return of all other copies of plans and specifications in good condition within 30 days after the award of the contract or the rejection of the proposal.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bond shall conform to the provisions of the Highway Laws, as set forth in "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

Bids: December 6, 1960

Feeder Road Program

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR

BIDS: December 6, 1960

NOTICE TO CONTRACTORS

The Ministry of Public Works of the Republic of El Salvador advises that on December 6, 1960 bids will be received for the construction of a major portion of the proposed Feeder Road Program of the country. The Specifications, Plans and Contract Documents will be for sale in El Salvador on October 31, 1960.

All Contractors, interested in taking part in this bidding are requested to obtain the necessary Documents, Plans and Specifications from the Office of the Proveedor Especifico de Obras Publicas, Edificio Morazan a C. P., San Salvador, El Salvador, C. A. All requests must be accompanied by a certified check in the amount of Sixty Dollars ($60.00) which will not be returned.

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR,
C. A.

Bids: December 12, 1960

Notice to Consulting Engineers

The Borough of Conway, Beaver County, Pennsylvania, will receive bids for the position of Consulting Engineer, at the Borough Building, Conway, Pennsylvania, until 7:00 P.M. Monday, December 12, 1960 and bids will be opened immediately thereafter.

The services required of the successful bidder are incorporated in the Trust Indenture of the Borough of Conway and other services required by Council regarding the operation of the Sewage Plant AND FACILITIES.

The right to reject any or all bids are reserved.

By order of the council of the Borough.
Rudolph Trombetta
Borough Secretary

Bids: January 11, 1961

Elizabeth River Tunnel Commission Norfolk, Virginia

Sealed proposals for CONTRACT NO. 2 Tunnel Open Approaches, Buildings, Tunnel Finish and Paving, and Mechanical and Electrical Work, of the SECOND ELIZABETH RIVER TUNNEL and APPROACHES, will be received by the Elizabeth River Tunnel Commission at the City Council Chamber, City Hall Building, 235 East Plume Street, Norfolk, Virginia, until 2 P. M. (EST) Wednesday, January 11, 1961, at which time and place the bids will be publicly opened and read aloud.

CONTRACT NO. 2 consists essentially of the excavation for and construction of the East and West Tunnel Approach Sections from the Tunnel Portals to grade, including a railroad bridge over the East Tunnel Approach; the construction of the superstructures of two Ventilation Buildings and the Portal Tide Gate House; the installation of wall finish and a hung ceiling in the Tunnel; the installation of bituminous concrete pavement in the Tunnel and Tunnel Open Approaches, and complete mechanical and electrical work for the Buildings and Tunnel.

Plans and Specifications may be viewed at the office of the Commission at its Administration Building, Berkley, Norfolk, Virginia, and may be viewed and purchased at the office of the Engineer, Parsons, Brinckerhoff, Quade & Douglas, 165 Broadway, New York 6, New York, upon payment of $45 per set. Additional sets of Plans will cost $35, and additional copies of the Specifications will cost $10. Documents are non-returnable for refund. The Specifications, consisting of the Standard Specifications (Virginia Department of Highways, Road and Bridge Specifications, April 1, 1958 Edition), and the Special Provisions (in two volumes), will include copies of the Proposal Form, Proposal Bond Form, Contract Form, and Contract Bond Form. Any and all other pertinent information may be obtained at the New York office of Parsons, Brinckerhoff, Quade & Douglas.

Bidders are required by law to be registered with the State Registration Board for Contractors in Virginia.

A Proposal Bond, prepared in the form furnished, will be required of the bidder, in an amount of not less than twenty per cent (20%) of the aggregate bid for all work performed under CONTRACT NO. 2.

The Elizabeth River Tunnel Commission reserves the right to reject any and all proposals.

West Pakistan Water & Power Development Authority Indus Basin Scheme Mangla Dam Project

The West Pakistan Water and Power Development Authority announce that, having in September 1959 invited by international advertisement applications from firms wishing to tender for the main civil engineering contract for Mangla Dam Project, they have placed the contracting organisations listed below on the List of Approved Tenderers for Contract No. 2.

The decision to proceed with this project must await the availability of the funds to be administered by the International Bank for Reconstruction and Development.

List of Approved Tenderers for Contract No. 2.

1) A consortium comprising:—
Western Contracting Corporation
Raymond International (U. K.) Construction Ltd.
Entreprises Campenon Bernard.

2) A consortium comprising:—
Peter Kiewit Sons' Co.
Oman-Farnsworth-Wright.

3) Guy F. Atkinson Company.

4) A consortium comprising:—
Utah Construction & Mining Co.
Brown & Root, Inc.
Taylor Woodrow (Overseas) Limited
Compagnie Industrielle de Travaux
Etablissements Billiard
Societe Francaise d'Entreprises de Dragages et de Travaux Publics
Societe Generale d'Entreprises

5) A consortium comprising:—
J. A. Jones Construction Company
Grove Shepherd-MacLean Grove, Inc.
A. B. Skanska Cementgjuteriet
Angus Robertson (Overseas) Ltd.
Sir John Jackson Ltd.

6) A consortium comprising:—
Morrison-Knudsen International Constructors, Inc.
Kaiser Engineers and Constructors, Inc.
Perini Corporation
John Laing & Son Ltd.
George Wimpey & Co. Ltd.
Bechtel Corporation.

7) Merritt-Chapman & Scott Corporation.

8) Group 1 consortium comprising:—
Christiani & Nielsen A/S
Compagnie Francaise d'Entreprises.
Conrad Zschokke Ltd.
Gammon Engineers Ltd.
Holland & Hannen and Cubitts Ltd.
Giuseppe Torno & Cie.-Soc. P. Az.
C.O.E.H.B.A., S.A.
Vinnell Company Inc.

Bids: December 15, 1960

The Port of New York Authority

Sealed proposals for the following work will be received at the Office of the Chief Engineer, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on date indicated, at which time said proposals will be opened and read in Room 1108.

Contract NYA-340.001—New York International Airport—Central Heating and Refrigeration Plant Expansion—Hot Water Generators—Deposit $30.00 per set of documents—Bids will be received until 2:30 P.M. on Thursday, December 15, 1960.

Contract NYA-340.002—New York International Airport—Central Heating and Refrigeration Plant Expansion—Absorption Machines—Deposit $30.00 per set of documents—Bids will be received until 2:30 P.M. on Thursday, December 15, 1960.

Contract documents may be seen at the Office of the Assistant Chief Engineer for Design, Room 1115, 111 Eighth Avenue, New York 11, N. Y. Documents will be furnished upon receipt of the above deposit (each set including one copy of the Contract Drawings) for not more than three sets to any one company. Additional sets will be furnished upon payment of an amount for each set equal to the deposit indicated above, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt will be issued. The receipt shall be delivered to Room 1115 where the documents will be furnished.

Those who have submitted a bid on the contract directly to the Authority will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt, Chairman

New York, December 1, 1960

OFFICIAL PROPOSALS

RATE: The rate for Official Proposal Advertising is $2.40 per line (or fraction) per insertion.

COPY RECEIVED: up to 10:30 A.M. Friday for issue out following Thursday subject to space open for last minute ads.

SEND COPY: to Official Proposal Division, Classified Adv. Div., P. O. Box 12, New York 36, N. Y.

EMPLOYMENT NATIONAL COVERAGE OPPORTUNITIES

DISPLAYED RATE:

The advertising rate is $39.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

DECEMBER 15TH ISSUE CLOSES DECEMBER 5TH

UNDISPLAYED RATE:

$2.40 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take ½ of above rate.

Box numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to agency Commission.

Send NEW Ads and Inquiries to Classified Advertising Division or ENGINEERING NEWS-RECORD, P. O. Box 12, N. Y. 36.

CIVIL ENGINEERS

Overseas Opportunity

For graduate civil engineer, on a multi-purpose dam project in Thailand, who has a minimum of five years experience on excavation, mass concrete placement, structural concrete work, penstock steel fabrication and erection, including welding inspection and radiograph interpretation.

Successful applicant must pass physical examination and security investigation.

- **24 Month Contract**
- **Completion Incentive**
- **Living Quarters**
- **Excellent Vacation Allowance**
- **Medical Care and Insurance**
- **Overseas Bonus**

Only complete resumes which include salary information will be considered.

SVERDRUP & PARCEL ENGINEERING COMPANY

915 Olive Street, St. Louis 1, Mo.

SALES REPRESENTATIVE

EARTH MOVING EQUIPMENT

Large manufacturer seeks an experienced district representative, and a sales development engineer with crawler tractor experience. These are exceptional opportunities with a rewarding future for capable men with extensive knowledge of heavy duty earth moving equipment. Please send resume, including present earnings in complete confidence to:

Employment Manager

Euclid—Division of General Motors

Hudson, Ohio

SALES ENGINEERS SANITARY

Dorr-Oliver's expanding activity in the Sanitary field has created a need for additional sales staff.

We are looking for men who have a B.S. or M.S. Degree in civil or chemical engineering with sanitary option. Some experience preferred in public health, consulting engineering or equipment sales.

Please send resume including salary requirement to:

C. R. FARRELL

DORR-OLIVER INC.

Havemeyer Lane Stamford, Conn.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

• POSITIONS VACANT

Civil Engineer experienced in office and field work covering heavy construction, road, bridge and dam construction. Give full details as to age, experience, marital status, salary required and reference in first letter. P-5599, Engineering News-Record.

Director of Specifications Department. Large Midwest consulting firm has immediate opening for capable individual with broad experience in specification writing for all branches of building construction work. Must also possess administrative ability. Send complete resume of educational background and experience, including personal qualifications and small photograph to P-5847, Engineering News-Record.

Draftsmen, Structural—Experienced, Checkers and detailers of structural steel shop dwgs. Relocation expenses. Fink & Zwecker Co., 1100 Crescent Ave., N.E., Atlanta 9, Ga.

Estimator — For established contractor in Deep South Metropolitan area, specializing in Heavy Construction, Foundations and Sewer and Water Plants. Graduate Civil Engineer, Age 30 to 38 preferred. P-5645, Engineering News-Record.

Senior Cost Engineer. Must be familiar with the Uniform System of Accounts for Electric Utilities. Duties will consist of analyzing completed major construction projects for an Electric Utility. Experience with the Federal Power Commission or a State Public Service Commission would be desirable. Some experience with the Property Record Department of any Electric Utility would also be an asset. Please send complete information on experience, references, salary requirements, and availability. Indianapolis Power & Light Co., 25 Monument Circle, Indianapolis 6, Indiana, Employment Division.

Wanted—Engineers competent to design and prepare plans for Sewage Treatment Plants. State age, experience, salary requirements, when can report, references. Position permanent. P-5717, Engineering News-Record.

• POSITIONS VACANT

Sanitary Engineer. Civil or Sanitary Graduate preferred. Location Lancaster, Pennsylvania. Established consulting firm has permanent position for young engineer. Experience or training in design of water and sewage facilities and treatment plants desired. Send complete resume, with references and salary desired to H. F. Huth Engineers, Inc., 53 North Duke Street, Lancaster, Penna.

Engineers—Structural. Expd. in design of schools, hospitals, housing, etc.; concrete & steel, for consulting engineers office, New Jersey. Write giving education, exp. & salary: Box 1109, 1501 Bdway., N.Y. 38, N.Y.

Registered Civil Engineer to serve as project engineer in the design of municipal water and sewage treatment facilities. Substantial prior treatment experience required. Salary open, age limit 40 years. Reply to Parker and Associates, Consulting Engineers, 1734 Ninth Street, Greeley, Colorado.

• POSITIONS WANTED

Construction executive age 37 qualified manager of equipment maintenance division. Prefer large earthmoving company. PW-5579, Engineering News-Record.

Master mechanic desires permanent position with heavy construction company. 12 years field and shop experience on all types of machinery. Excellent labor relations and a good pusher. PW-5584, Engineering News-Record.

Engineering Executive. Wide industrial, chemical and civil experience; all phases administration and management. Organize and direct large design jobs or work in consulting and exec. asst. capacities. Proposals, reports, contracts, liaison, trouble shooting, P.E. in 5 States. PW-5598, Engineering News-Record.

Graduate, licensed civil engineer with extensive design, construction, and managerial experience over the past twenty years seeks position at management level with General Contracting organization. Available immediately. Willing to relocate anywhere USA or overseas for responsible position with adequate compensation. Will consider offers to share risks and profits. PW-5652, Engineering News-Record.

(Continued on following page)

WATER ENGINEER

(Civil Service Classification
Civil Engineer II—Hydraulic)
Monthly Salary Range $583 to $714

Job Requirements: Hydraulic design of water supply, treatment and pumping facilities. Report preparation and studies for long range planning of water supply facilities for large metropolitan area.
Education and Experience Requirements: B.S. in Civil or Sanitary Engineering and five (5) years experience in above special fields—or—the equivalent combination of education and experience in lieu of a degree. College transcripts must be filed with application for college credits claimed. *Additional data will be sent to all applicants. Send complete summary of your education and experience to:*

Mr. Henry W. Korner, Executive Secretary
Civil Service Board, City of Miami
3318 Pan American Drive Miami, Florida

CHEMICAL OR MECHANICAL ENGINEERS

One of the world's largest pharmaceutical companies has available varied and challenging assignments in Plant Engineering. About five years' experience required in the process industries. Applicants should be capable of assuming full responsibility for project design and coordination. Knowledge of construction methods and chemical maintenance desirable.

Send resume to Personnel Dept.

Parke, Davis & Company, Detroit 32, Mich.

• POSITIONS WANTED
(Continued from preceding page)

Superintendent capable complete charge experienced heavy excavation and grading engineering and estimating. Now employed, available soon. P.O. Box 118, Des Moines 1, Iowa.

Sales Eng.—Estimator, GC, sub-contract (no mechanicals). Strong Met. N.Y., Northeast U.S. experience. P.C., P.S. conc. specialist. PW-5640, Engineering News-Record.

Executive Female: 18 yrs exp all phases genrl const, efficient coordinator, administrator, mgr, atty, govt contracts claims. PW-5657, Engineering News-Record.

Construction Engineer-Superintendent, ten years in responsible positions with consulting engineers and contractors on large highway projects, U.S. and O.S. Desire position with consulting Engineers or Progressive Contractor. Speak, read Spanish; active passport; available now. Location preferred, Northeastern U.S. or Foreign assignment. P. O. Box 267, Towanda, Pa.

Const. Supt-Engineer, 46. Heavy experience Chemical Plants, Atomic Installations, Power Plants, Paper Mills, Sugar Mills, Dams, Institutional Work. Bid to start up, including Mechanical Installation. PW-5666, Engineering News-Record.

Professional Civil Engineer and Registered Land Surveyor wants position with General Contractor in Connecticut. PW-5669, Engineering News-Record.

Construction Manager 25 yrs. in heavy commercial and Industrial construction. Detailed knowledge all phases structural, mechanical including estimating, scheduling, office and field supervision, cost control and organizational ability. G. K. Chiles, 211 Del Amigo Rd., Danville, Calif. Vernon 7-5206.

Chief Estimator—Engineer. 12 years experience commercial, industrial, heavy construction. Capable of handling jobs from takeoff to completion. Presently employed but willing to relocate. PW-5364, Engineering News-Record.

Project Mgr.—Const. Supt. Flood Control, Bldgs., Roads, Tunnels, excellent Mech. background, available now. 9238 East Parkhill Drive, Washington, DC OL. 26196.

General Manager 22 yrs. all phases hvy. constr. Contract administration & project supervision, estimating, procedures, claims. Major projects U. S. & O. S. PW-5578, Engineering News-Record.

Structural Engineer, P.E., B.S.C.E., M.S. Ph.D. experienced thoroughly in structural steel and R.C. design of industrial plants, bridges, heavy foundations. Broad backgrounds. Mid-forties. Desire responsible position. Location desired central and east of Midwest. PW-5712, Engineering News-Record.

Engr. 39, Plant, Heavy Piping control systems, L.P. steam, construction contracts office & Field, Boston & Vic. PE. BSCE, LLB. PW-5704, Engineering News-Record.

Construction Management Executive. I desire top position with full responsibility creating and bringing new business for progressive general and heavy construction contractor. Can organize top management and supervision of large projects with associates of proven experience. Hours, travel no object—will go anywhere—work all profitably necessary hours. Extensive knowledge and successful experience in estimating; contract negotiation and administration; organization; sales; layout; specification and design work; scheduling; customer relations; change order and punch list administration; and labor relations and negotiations. Successful record of progressively better project profits. Resume and personal data on request. Would appreciate personal interview at your convenience. PW-5700, Engineering News-Record.

CIVIL ENGINEERS

Civil Engineers with 2 to 15 years of experience in layout and design of dams, intakes, powerplants, spillways, canals, etc., to fill immediate openings in a design office. Some experience in writing reports desirable but not essential. Please send complete resume to Personnel Manager.

HARZA ENGINEERING COMPANY
400 West Madison Street, Chicago 6, Illinois

ENGINEERS STRUCTURAL

Expd in design of schools, hospitals, housing, etc., concrete & steel, for consulting engineers office, New Jersey.
Write giving education, exp & salary:

P-5521, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

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UNDISPLAYED RATES

$2.40 a line, min. 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one additional line in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

• FOR SALE

Fennel 1" Theodolite type F2. For Details— Edwards Engineering, 4379 30th St., San Diego, Cal.

DON'T FORGET
the box number when answering advertisements. It is the only way we can identify the advertiser to whom you are writing.

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Small or medium sized Consulting Engineering firm engaged in civil, mechanical or electrical engineering. Licensed to practice engineering as a corporation preferred over a partnership. Full confidence respected. Only principals apply.

BO-5660, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

CONSTRUCTION SUPERVISION

Exclusive Training Course by mail for top positions. Publishers Manual of Advanced Construction Management. Send postcard for details.

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GROUT PUMP

Continuous worm feed, mounted low 4 wheels. Interchangeable gasoline engine, 220/440 electric motor. Cap. up to 10 gpm @ 300 rpm. Pressures 0 to 450#. Good condition—used on one job. Excellent buy.

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OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. Forty-eighth year.
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Model 11 crawler mounting, gas power, 10' screed with complete attachments to 14' spreading width. Used only few months—next to new condition.

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Designed For Controlled Concrete
60 cu. yd. per hour Capacity

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DAyton 9-6190

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200,000 gal. elevated steel tank. 38' dia. by 17' 6" high. 152' to top of tank. Riser 125'. Six steel legs. Excellent condition.

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9-W B.E. Elec. Drag, 165', 10 yd.
9-W B.E. Diesel Drag, 165' 12 yd.
7-W B.E. Diesel Drag, 140', 7 yd.
7400 Marion Diesel Drag, 175' 13 yd.
7400 Marion Elec. Drag, 175', 12 yd.
1855 P&H Diesel Drag, 130', 10 yd.
625 Page Diesel Drag, 160', 9 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W B.E. Diesel Drag, 125', 6 yd.
2400 Lima Elec. Drag, 130', 6 yd.
2400 Lima Diesel Drag, 130', 6 yd.
4500 Manitowoc Drag, 120', 5 yd.
120-B B.E. Elec. Drag, 115', 5 yd.
71-B B.E. Crane with 160' boom
3900, 3500 & 3000 Manitowoc Cranes
111-M Marion Drag, 100', 4 yd.
1055 P&H Diesel Drag, 80', 4 yd.
1601 Lima 4 yd. Shovel/Drag
1201 Lima Drag, 85', 3 yd.
54-B B.E. Drag, 85', 2½ yd.
5560 Marion 26 yd. Elec. Shovel
5323 Marion 18 yd. Elec. Shovel
190-B B.E. 8 yd. Elec. Shovel
151-M Marion 7 yd. Elec. Shovel
1600 P&H 6 yd. Elec. Shovels
170-B B.E. 6 yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
2400 Lima 6 yd. Std. & H.L. Shovels
120—B B.E. & 4121 Marion 4 yd. Elec. Shovels
1055 P&H 3 yd. H.L. Shovel
111-M Marion Std. & H.L. Shovels
1201 Lima & 54-B B.E. Standard Shovels
#6 Northwest 1½ yd. Standard Shovel
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Ingersoll-Rand Truck Mtd. & Crawler Mtd. Drillmasters
Keystone #50 Truck Mtd. Stardrill
Euclid Trucks, Rr. & Bottom Dump; Dozers, etc.

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Hazelton, Pa. GLadstone 5-3658

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EXCELLENT CONDITION
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High Speed in 6x6's
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For Sale: DRAGLINES—SHOVELS—CRANES
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We have used pipe, 1½" thru 8"
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ASSOCIATED PIPE & FITTING CO., INC.
PILING PIPE SHELLS MANDREL FITTINGS
"H" BEARING PILE-POINTS AND SLEEVES
TIMBER SPLICERS AND SHOES
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Call St. Louis Collect
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RENT, SELL OR BUY
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FAST SERVICE
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PILE DRIVING EQUIPMENT
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3700 PCS. BETH. SP8A, 50', 36' & 40' & 40' & 35'
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1200 PCS. ZP38-ZP32—25', 36', 50', 65', & 77'
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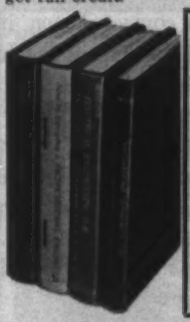

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A Betrayal of Trust

THE REAL MEANING of codes of professional ethics is dramatically illustrated in what must rank as one of the grossest betrayals of professional trust in modern history. In a long trial recently concluded in Italy, four men—a structural engineer, a city building official, a builder and his partner—were convicted of manslaughter following an apartment building collapse that killed 58 persons in Barletta (ENR Nov. 3, p. 28).

The structural engineer who designed the four-story building (which collapsed five months after its completion) planned it to bear on some one-story garage walls that were structurally inadequate for the additional load. The city building official, also an engineer, was bribed to issue a certificate of occupancy without inspecting the building. The four convicted men, including these two engineers, knew of cracking in the building's walls but did not order the structure evacuated.

The Barletta tragedy is a harrowing reminder that professional ethics concerns something far more than business practice technicalities, such as what constitutes competition on a price basis for professional services or what constitutes self-laudatory advertising. This tragedy in Italy is a shocking illustration of what happens when professional trusts are not kept.

The Italian Parliament has considered means of attaining stricter control of the nation's private building industry. Tightened building codes, administrative changes and reorganization may help. But, in Italy or here in the U.S., it would be futile to try to assure public safety through these means alone—the public must be able to rely ultimately on some engineer's professional competence and honor. This is the meaning of professional ethics in the most serious sense.

The Transportation Mess

IT WILL TAKE FOLLOW-UP if the report of the Woods Hole transportation conference (ENR Nov. 24, p. 21) is to result in any net gain on the transportation problem.

The report itself concluded: "Clearly, some kind of organizational device is needed for stimulating and providing a focus for stepped-up efforts in research and study of transport." The conferees suggested that an interim group be set up to formulate an acceptable research effort.

The governing board of the National Academy of Sciences-National Research Council, which sponsored the Woods Hole conference, meets in a few days. It is expected that the board will consider the role it might play in organizing a broad research plan. Speculation is that NAS-NRC is unlikely to take on the full job itself, since its funds are limited and the research it conducts for government or private agencies is usually less broad.

However, NAS-NRC would seem to be the ideal group to keep alive the spark generated at Woods Hole, perhaps even fan it aflame. Two facts support this assumption:

First, the Highway Research Board (a division of the National Research Council) is an active organization, correlating and, to some extent, guiding research in highway transportation. HRB membership includes persons and organizations that have a stake in other forms of transportation as well as highways. Perhaps now is the time to expand HRB's scope to include these forms of transportation, as has been proposed.

Second fact is that a broad-scale description of all the highway research needed has been developed already by HRB (ENR June 23, p. 129). Expansion of this research plan to embrace other forms of transportation might not be too formidable a task.

In any event, the Academy-Research Council should neglect no avenue of approach in considering its role in leading the nation out of its transportation mess.

A Matter of Attitude

WHY IS IT designers and builders of the missile bases have had so many difficulties? We recall no great volume of complaints from those who engineered and constructed the Arctic BMEWS installations. Fact is, the A-E who designed the Ballistic Missile Early Warning System and the joint ventures who built the stations were honored last week by the Corps of Engneers for the way they performed on this most difficult assignment.

In a brief ceremony at Eastern Ocean District Headquarters in New York City, Lt. Gen. E. C. Itschner, Chief of Army Engineers, presented citations to Harrison P. Eddy, Jr., of Metcalf & Eddy, and to Richard Lukens of Peter Kiewit Sons' Co., representing Greenland Contractors. Both citations recognized the difficulty of the work: The A-E was cited for working so flexibly on design as research and development of equipment continually called for changes in the installations; the contractor was commended for putting up with so many changes as the work progressed.

Can the missile base jobs have been plagued by the concept of concurrency and by change orders to any greater extent than were these BMEWS bases? Can the contract conditions or approach to labor problems differ so much as to cause the contrast between missile-base discord and BMEWS harmony? Why do we have the efficiency-sapping disputes on the missile bases when BMEWS was built without major labor difficulties?

We don't pretend to know all the answers. But maybe it's largely a matter of attitude, an appreciation by the BMEWS designers and builders of the vital importance of the new defense facility they were creating. Whatever the identity of the essential ingredients of the Arctic accord, they should be sought out and applied in the missile-base program. It would be encouraging to see some citations for overcoming difficulties there, too.

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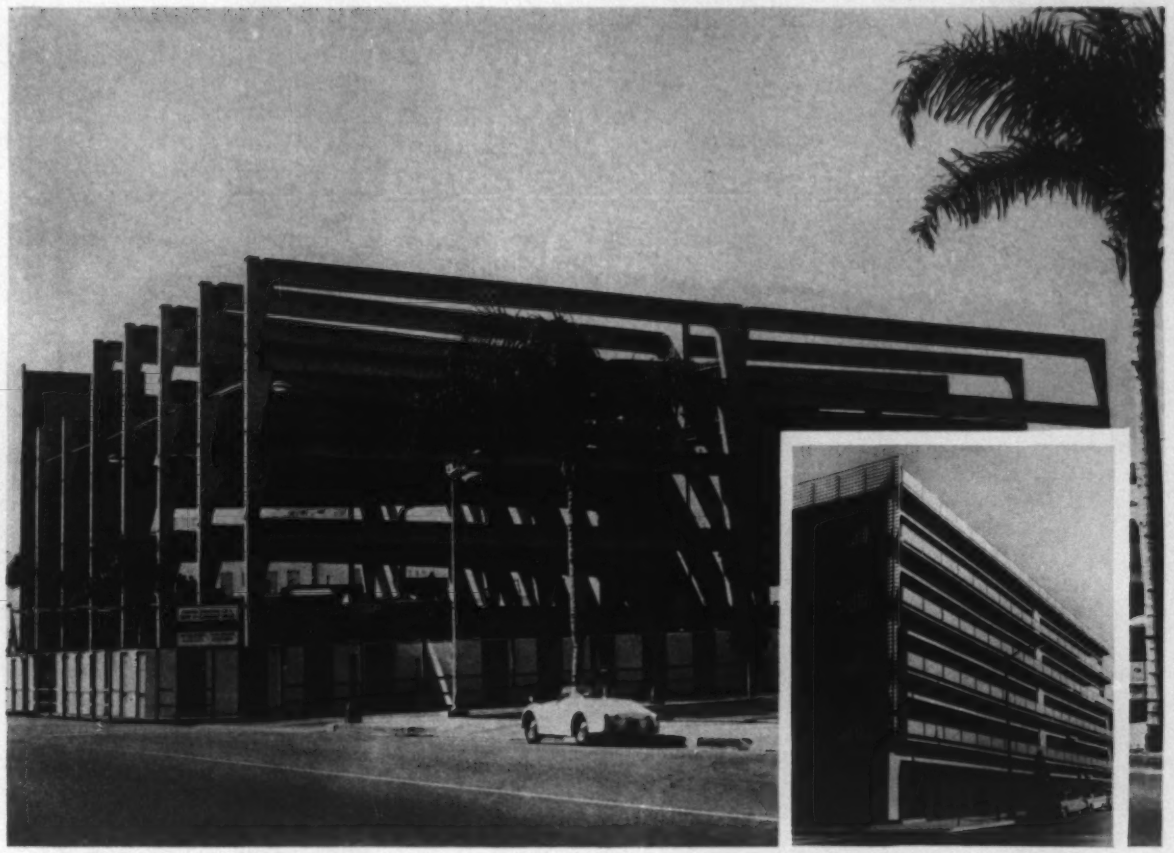

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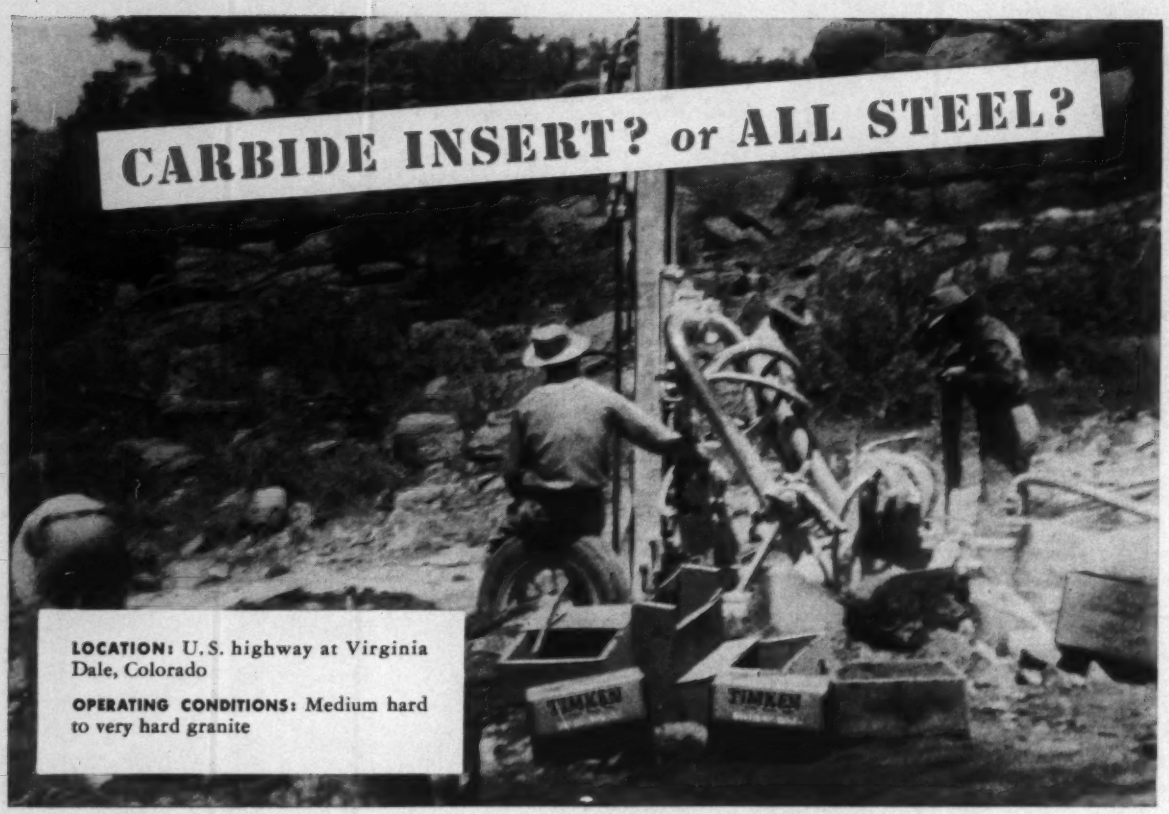
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